FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

BLUETOOTH USB DONGLE

MODEL NUMBER: BUA-200

FCC ID: AL8-BUA200
IC: 457A-BUA200

REPORT NUMBER: 09U12386-1

ISSUE DATE: FEBRUARY 18, 2009

Prepared for
PLANTRONICS, INC.
STREET345 ENCINAL STREET
SANTA CRUZ, CA 95060, U.S.A.

Prepared by
COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/18/09	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PLANTRONICS, INC.
345 ENCINAL STREET
SANTA CRUZ, CALIFORNIA, 95060, U.S.A.

EUT DESCRIPTION: BLUETOOTH USB DONGLE

MODEL: BUA-200

SERIAL NUMBER: BMS #5 R26

DATE TESTED: FEBRUARY 9 –10, 2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth USB Dongle

The radio module is manufactured by Plantronics, Inc.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	12.21	16.63
2402 - 2480	DQPSK	2.32	1.71

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an Integral Printed PCB antenna with maximum gain 1.61 dBi

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Rev.26

The EUT driver software installed in the host support Laptop during testing was CSR BlueSuit rev. 2.0, and HID Twidder Module Version 1.0.0.1

The test utility software used during testing was Bluetest.exe, rev. 2.0 and hidTwidder.exe

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Support Laptop	Dell	PP01L	Plantronics 30925	DoC
AC/DC Adapter	Dell	ADP-70EP	TH-09364U-17971-	DoC

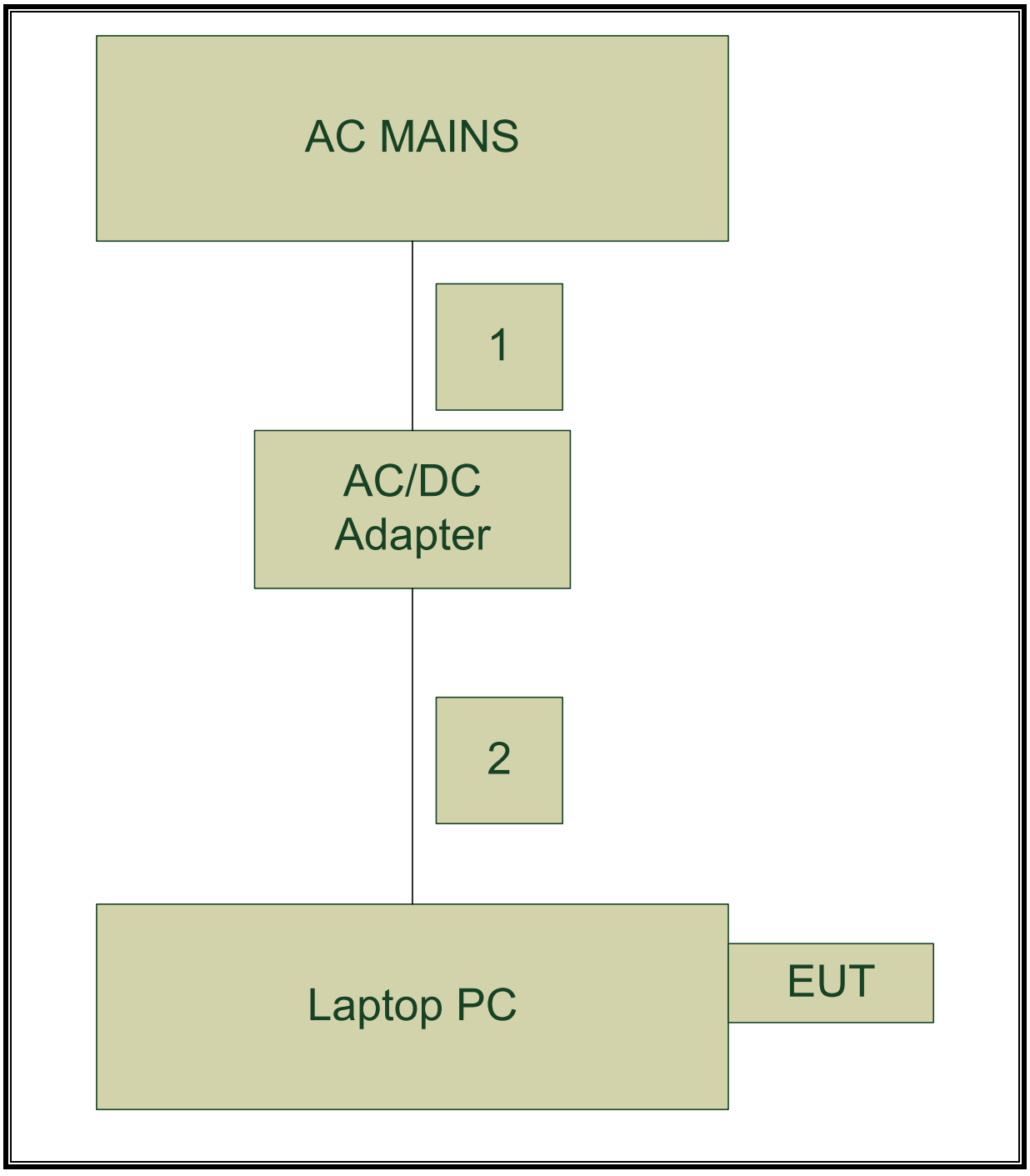
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	N/A
2	DC	1	DC Plug	Un-shielded	1.5m	N/A
3	USB	1	USB	Shielded	1m	N/A

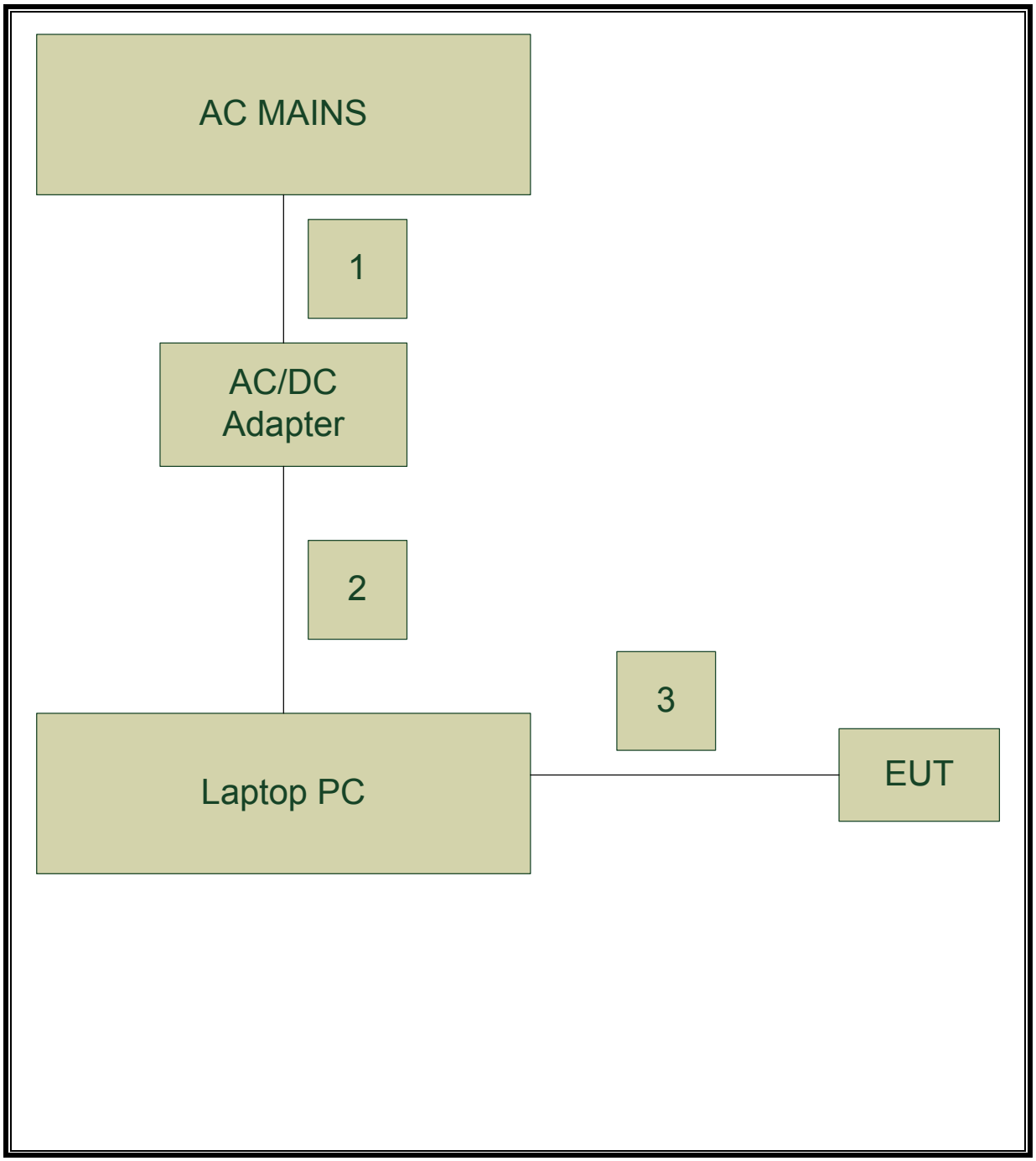
TEST SETUP

The EUT is installed in a host laptop computer via USB Port during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR EMISSION TESTS



SETUP DIAGRAM FOR RF CONDUCTED TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	01/20/09	04/20/10
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/07	12/04/09
Power sensor	Agilent / HP	E9327A	C00964	12/07/07	12/07/09
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	06/19/08	09/19/09
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	06/19/08	09/19/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/09	01/14/10
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/08	10/29/09
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/08	10/29/09
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	02/06/08	08/06/09
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	01/00/00	CNR
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/08	04/22/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	08/05/08	08/05/09
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	9/29/2007	11/28/2008

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

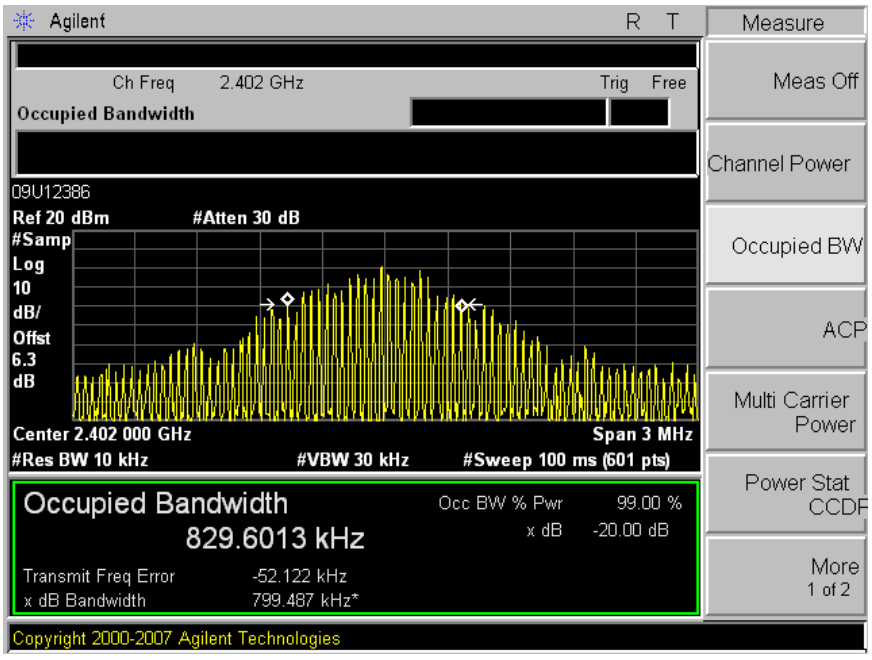
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

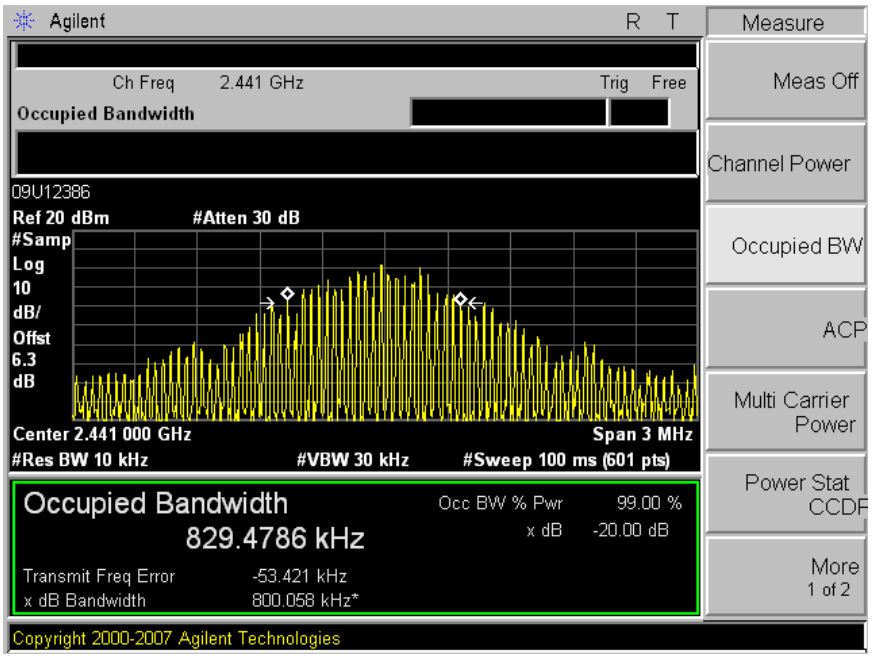
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	799.487	829.6013
Middle	2441	800.058	829.4786
High	2480	821.023	825.6779

20 dB AND 99% BANDWIDTH

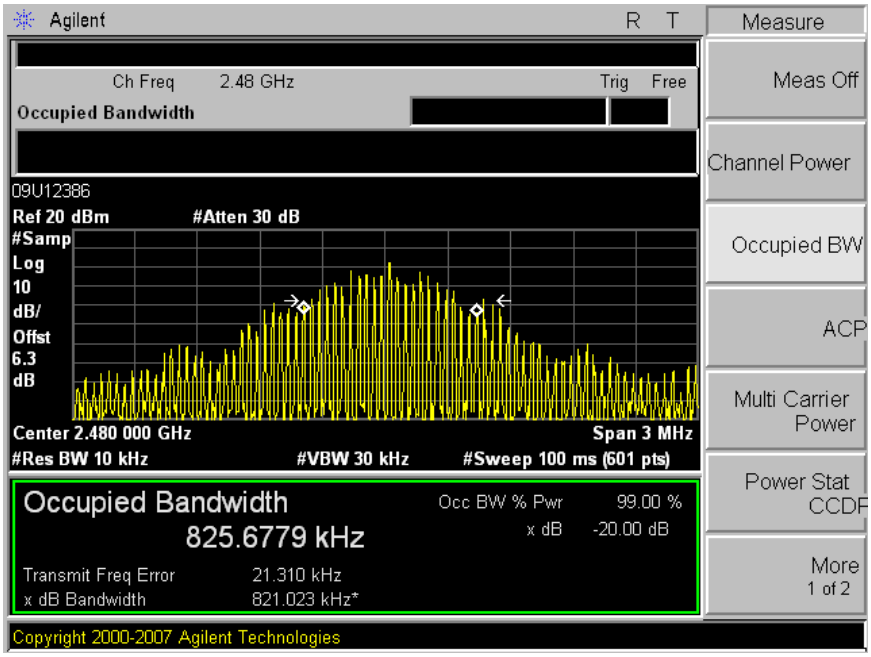
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

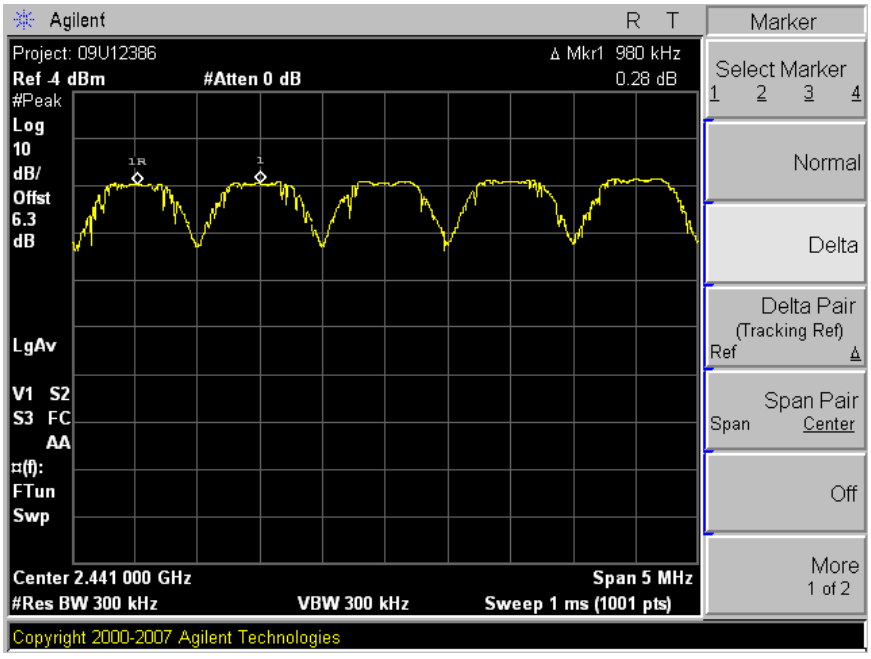
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

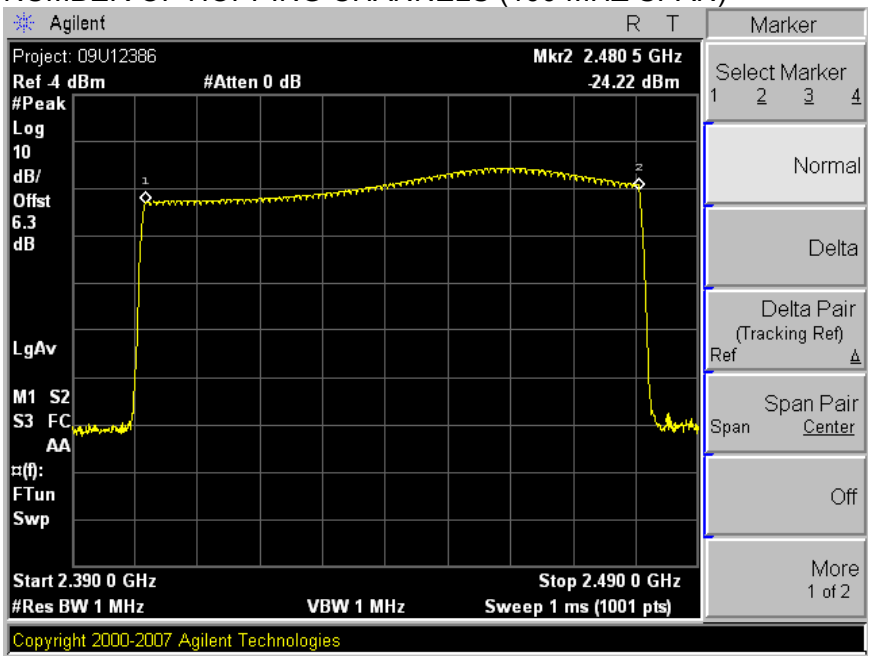
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

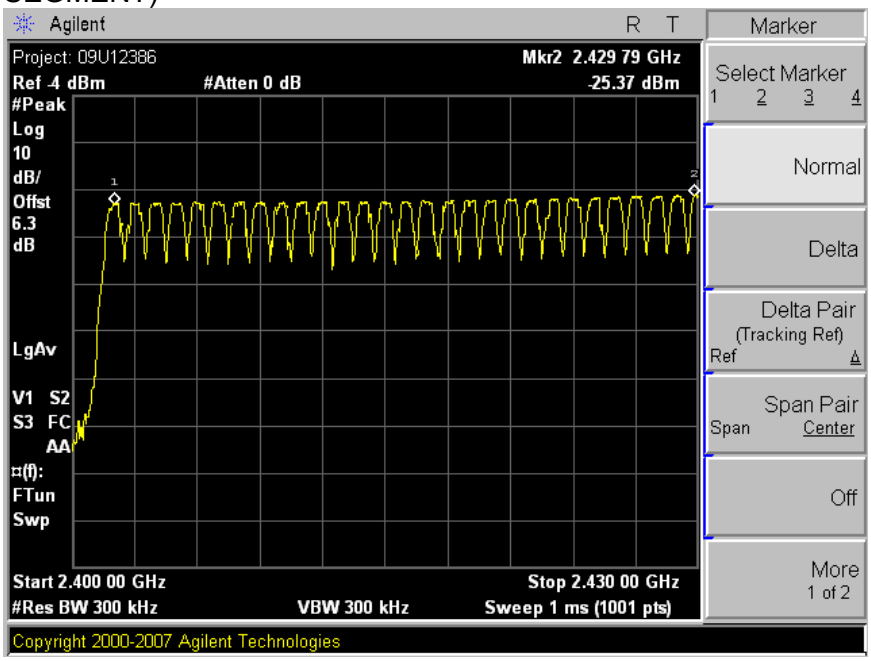
79 Channels observed.

NUMBER OF HOPPING CHANNELS

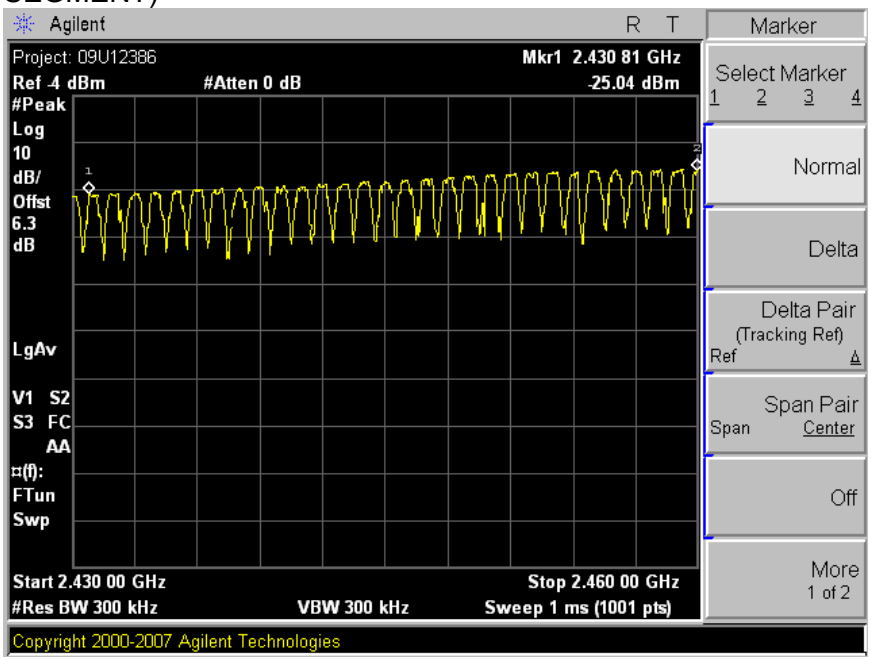
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



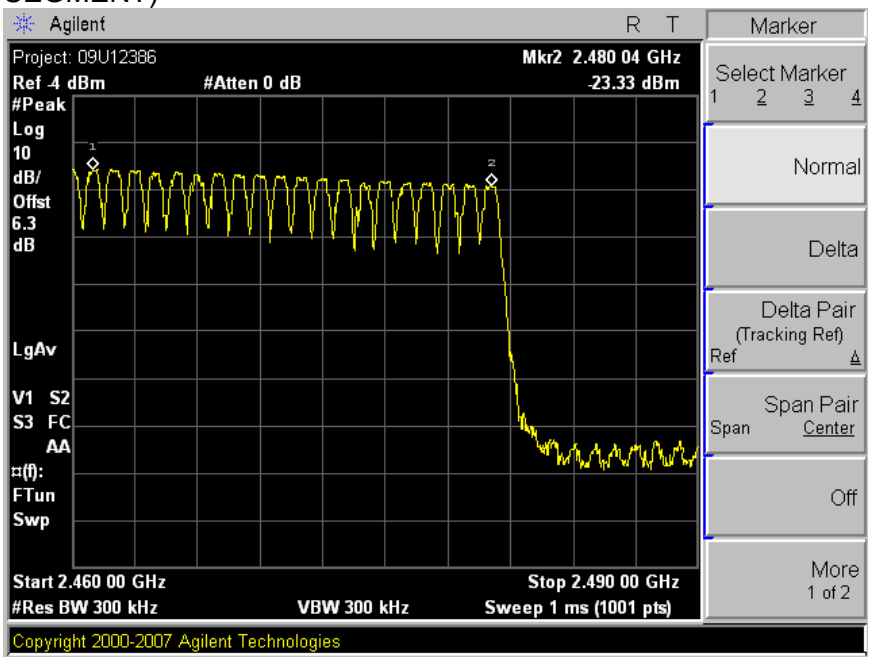
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

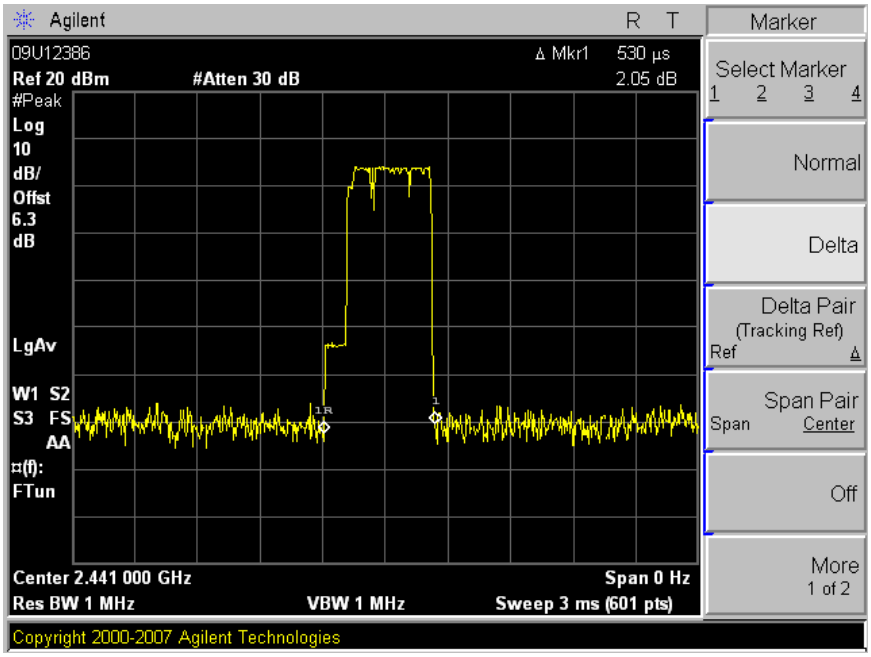
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

Time Of Occupancy = 10 * 32 pulses * 0.530 msec = 169.6 msec

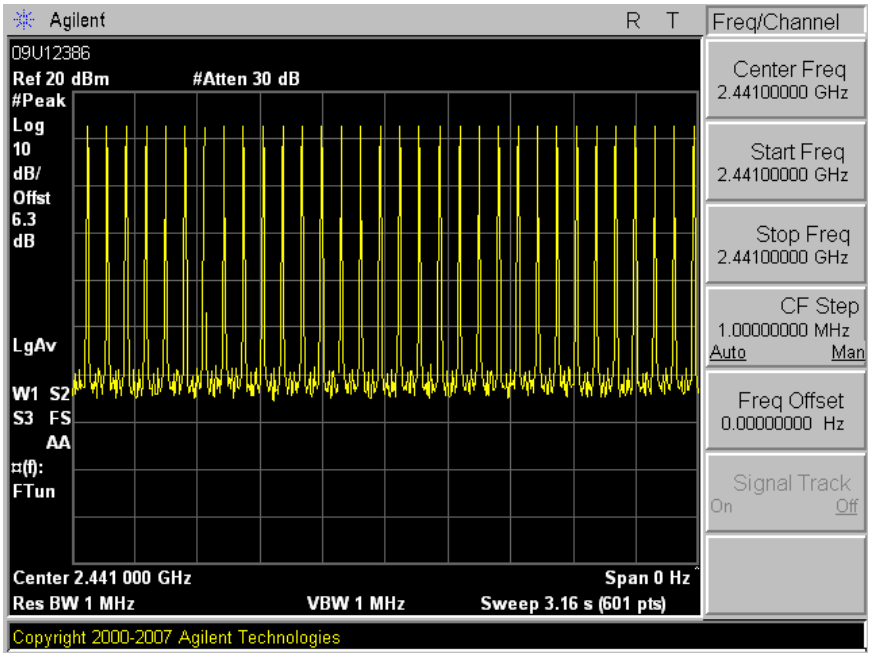
PULSE WIDTH

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is 1.61 dBi, therefore the limit is 30 dBm.

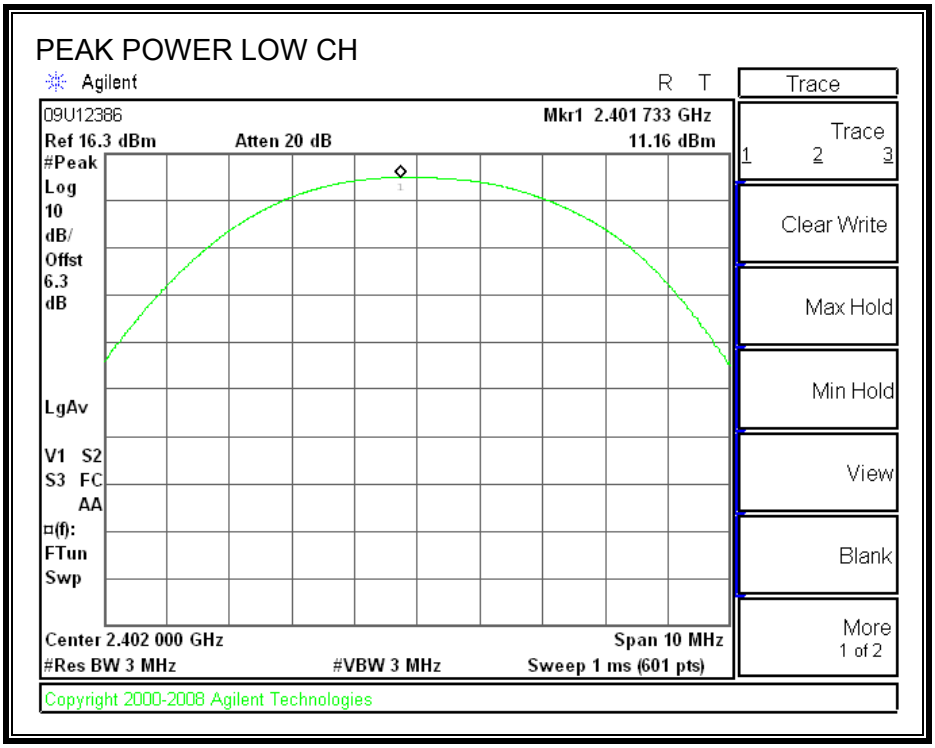
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

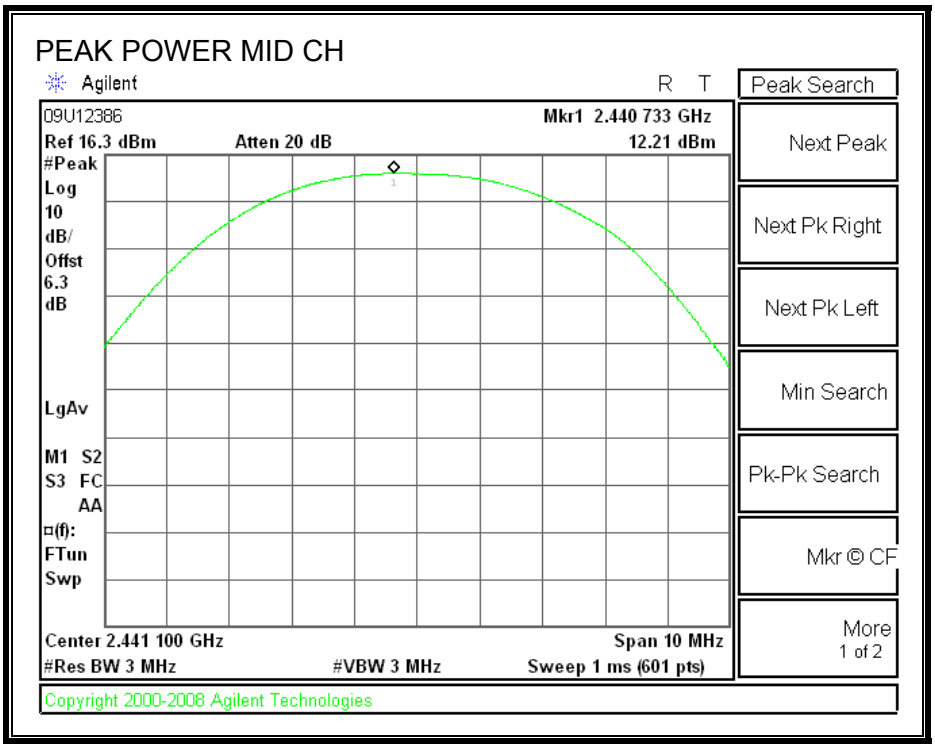
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.16	30.00	-18.84
Middle	2441	12.21	30.00	-17.79
High	2480	11.40	30.00	-18.60

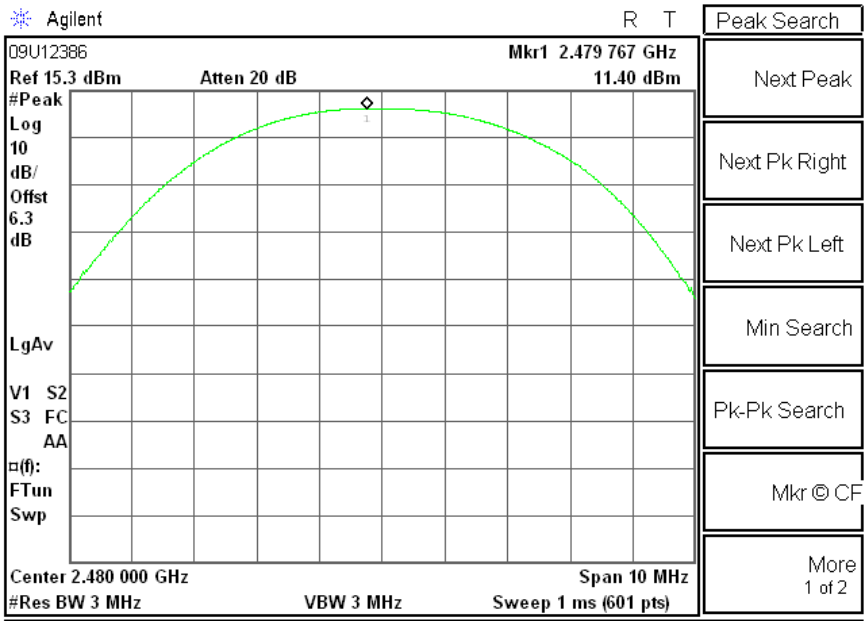
OUTPUT POWER



PEAK POWER MID CH



PEAK POWER HIGH CH



7.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 6.3 dB (including 6 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.94
Middle	2441	7.14
High	2480	6.55

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

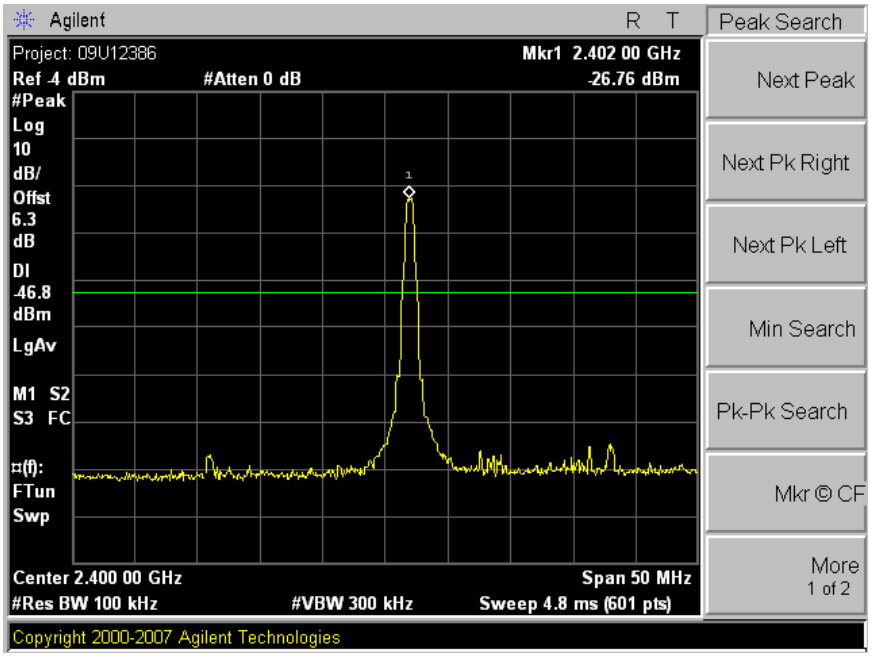
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

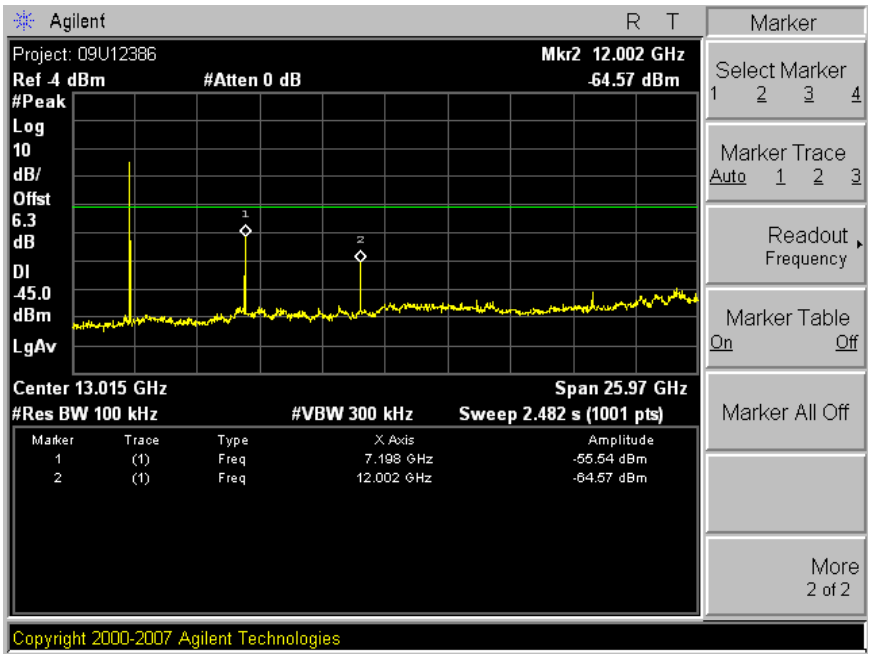
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

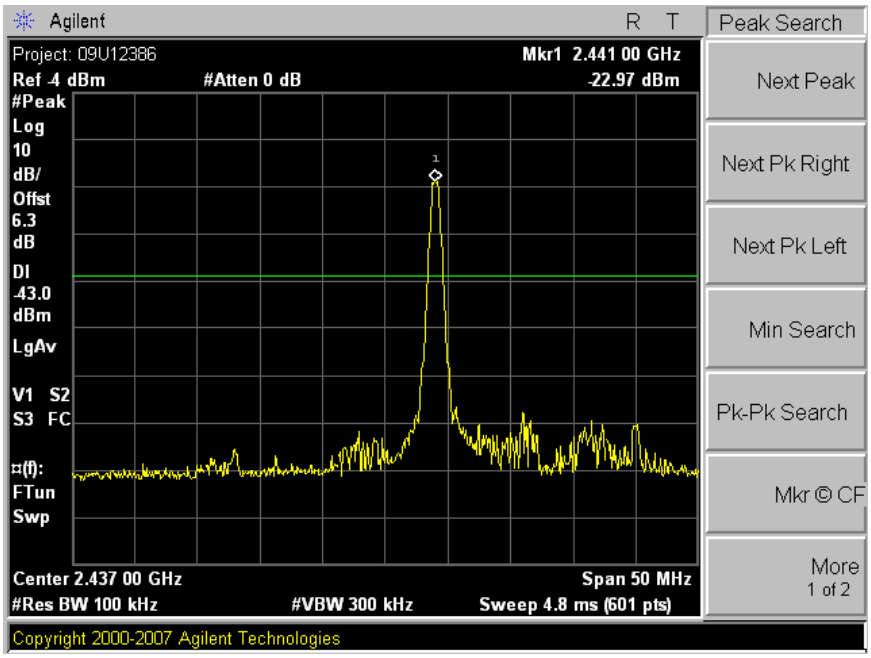


LOW CHANNEL SPURIOUS

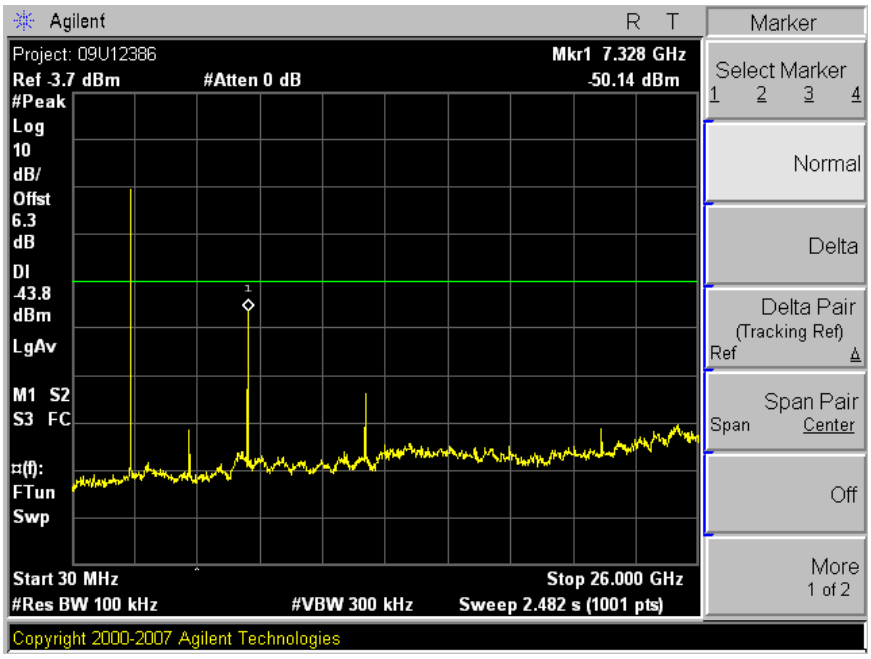


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

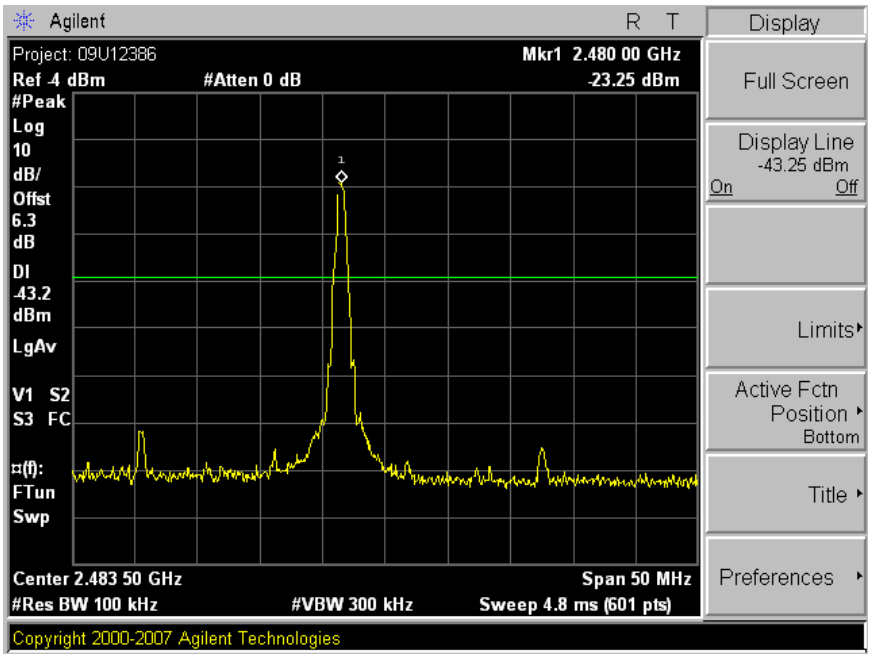


MID CHANNEL SPURIOUS

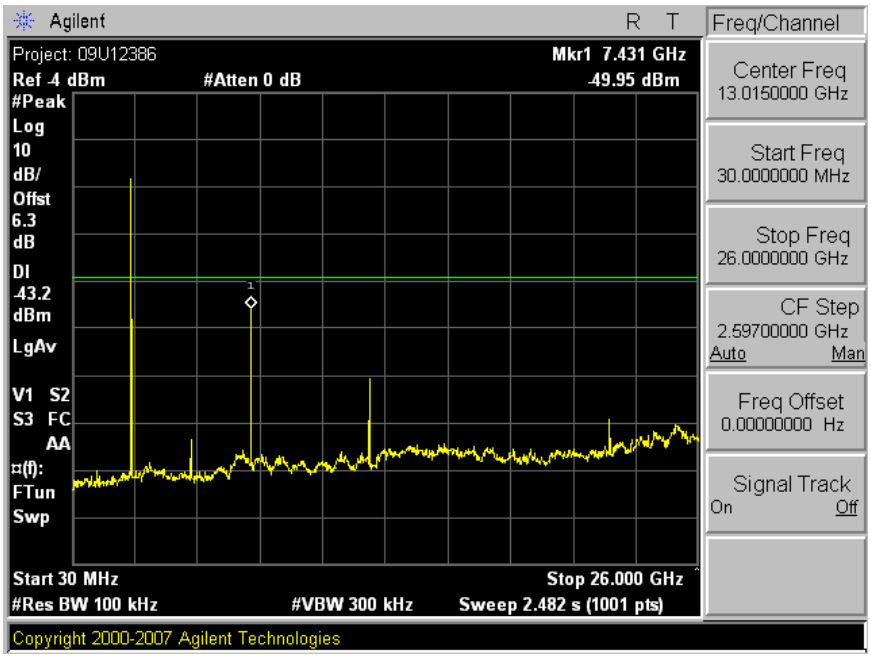


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

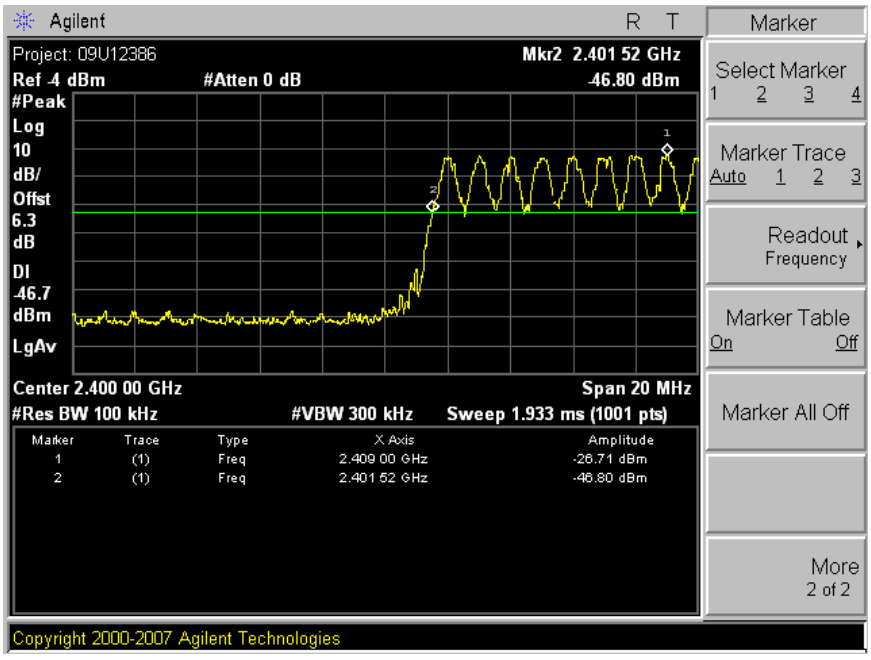


HIGH CHANNEL SPURIOUS

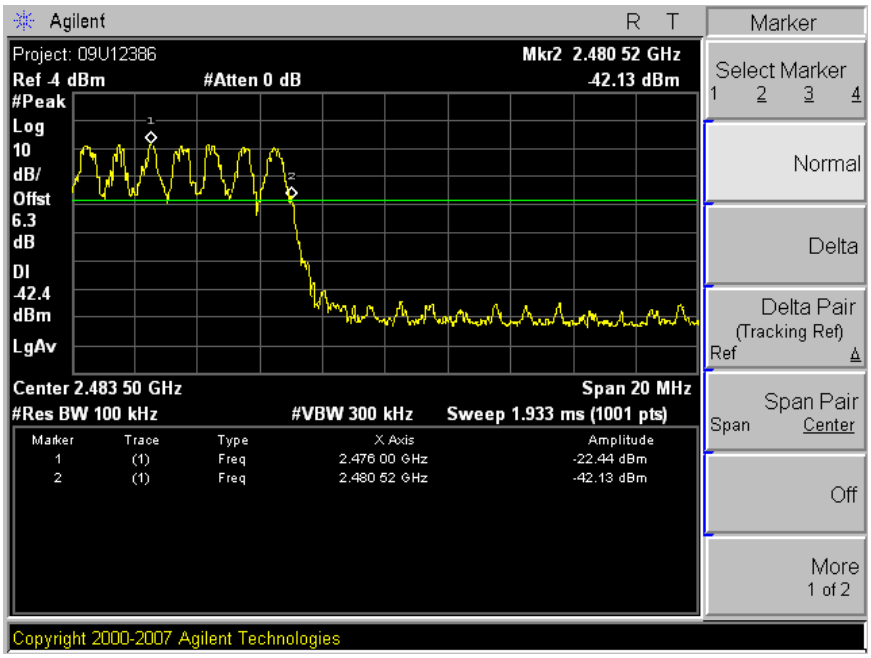


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



7.2. ENHANCED DATA RATE QPSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

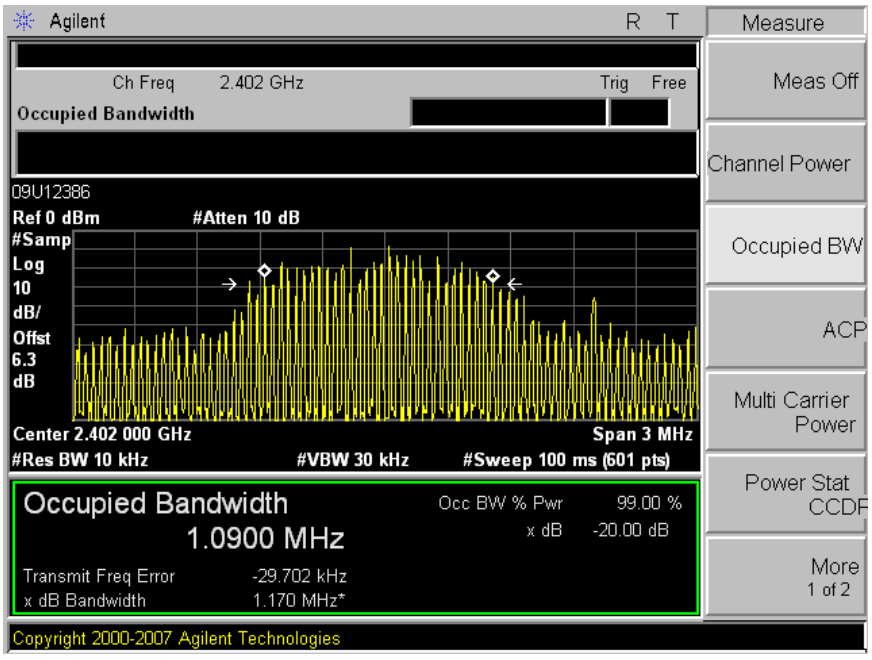
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

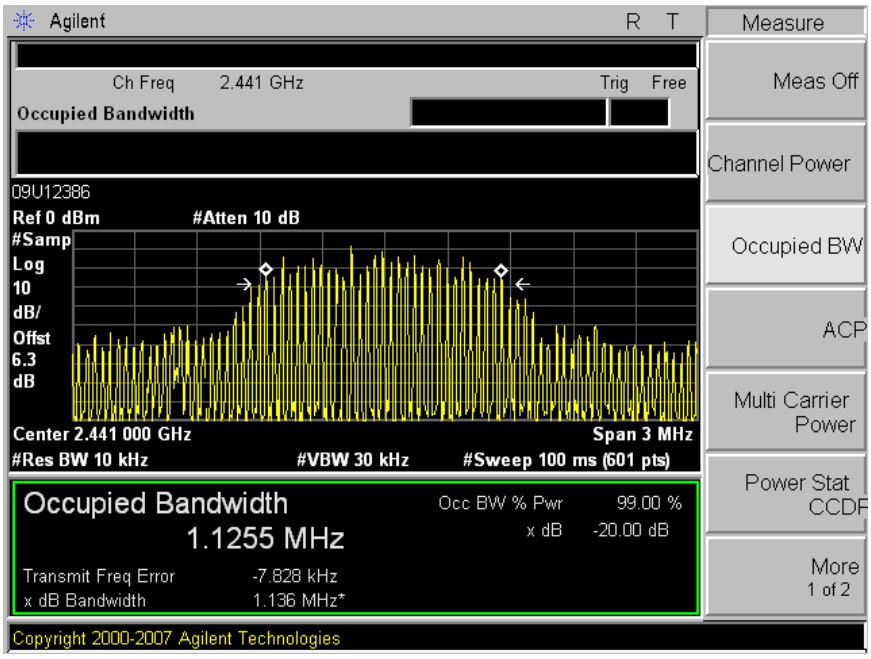
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1170	1090
Middle	2441	1136	1125.5
High	2480	1206	1125.1

20 dB AND 99% BANDWIDTH

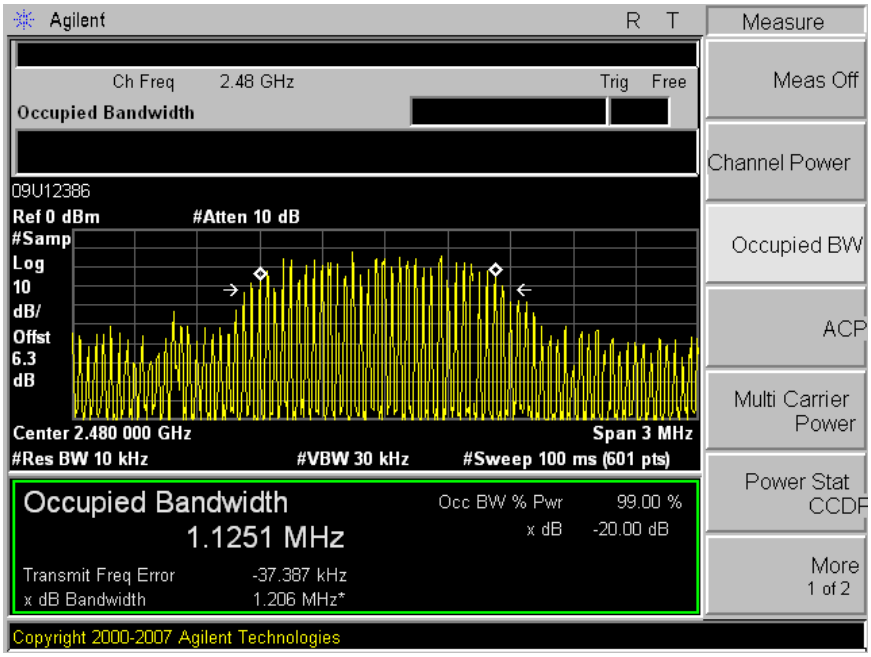
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

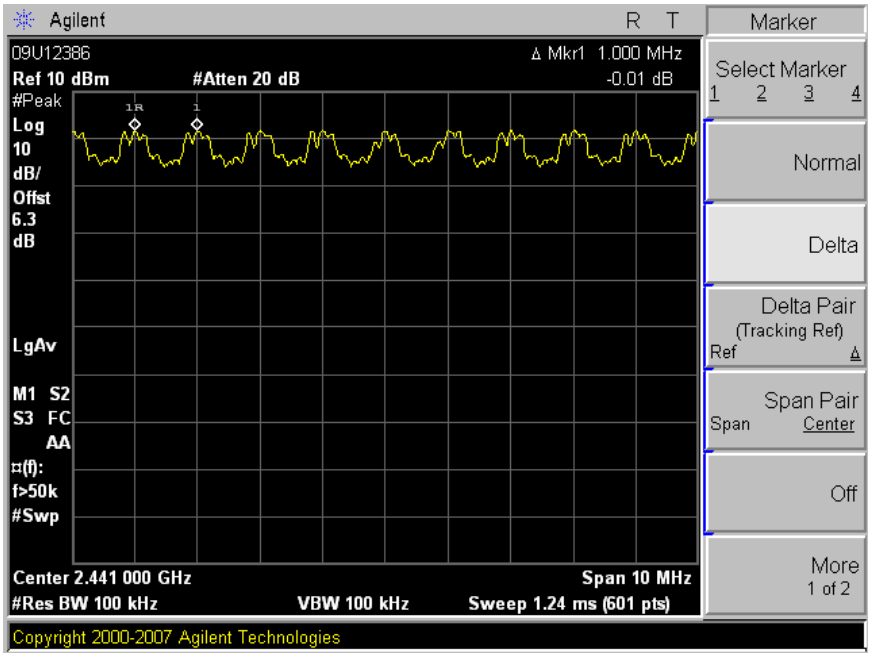
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

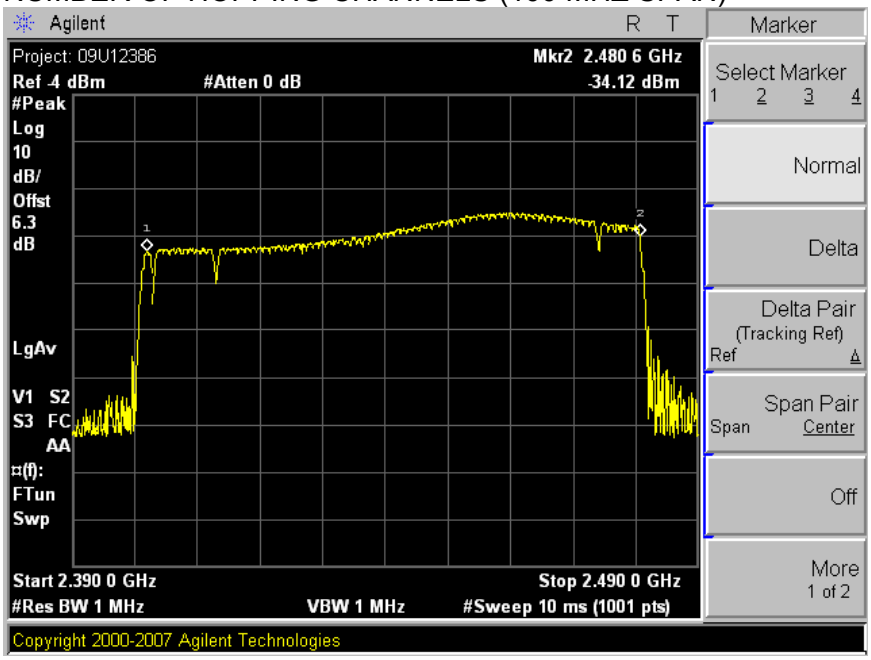
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

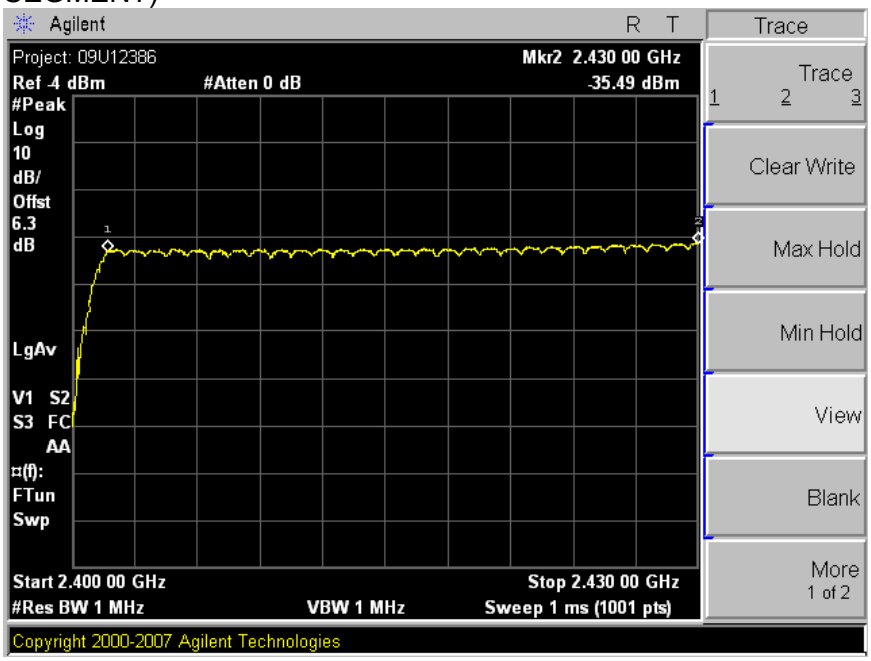
79 Channels observed.

NUMBER OF HOPPING CHANNELS

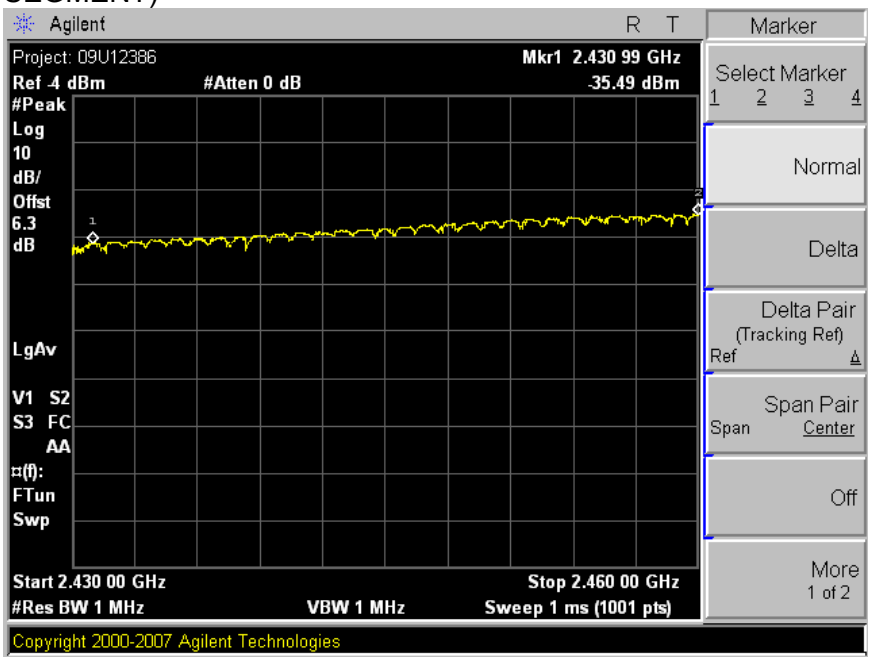
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



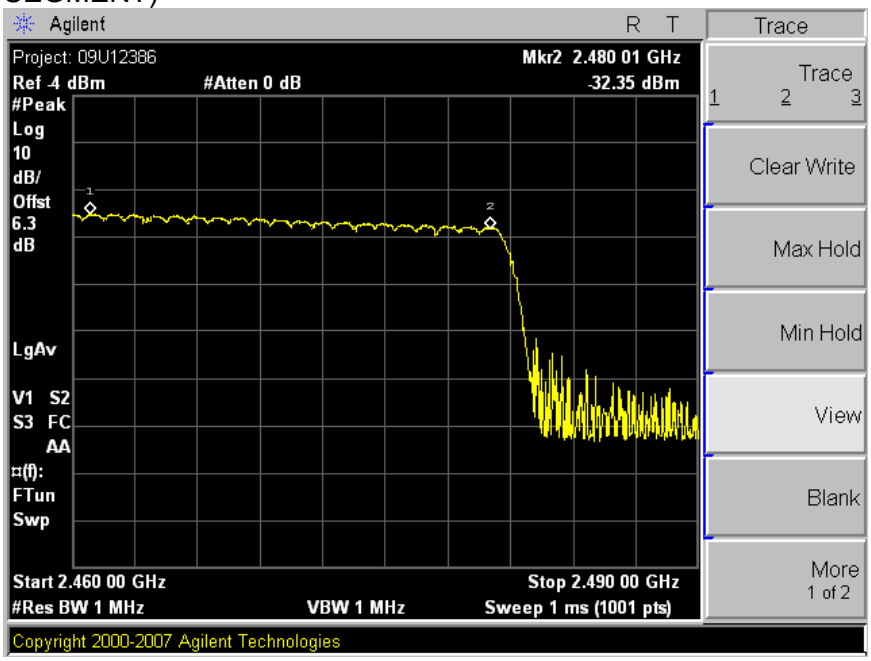
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

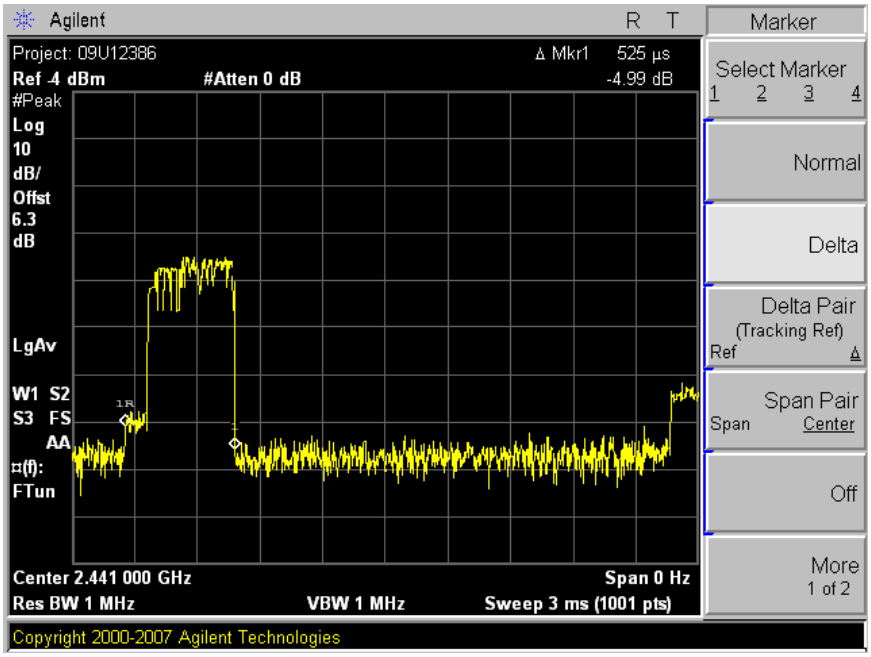
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

Time Of Occupancy = 10 * 32 pulses * 0.525 msec = 168 msec

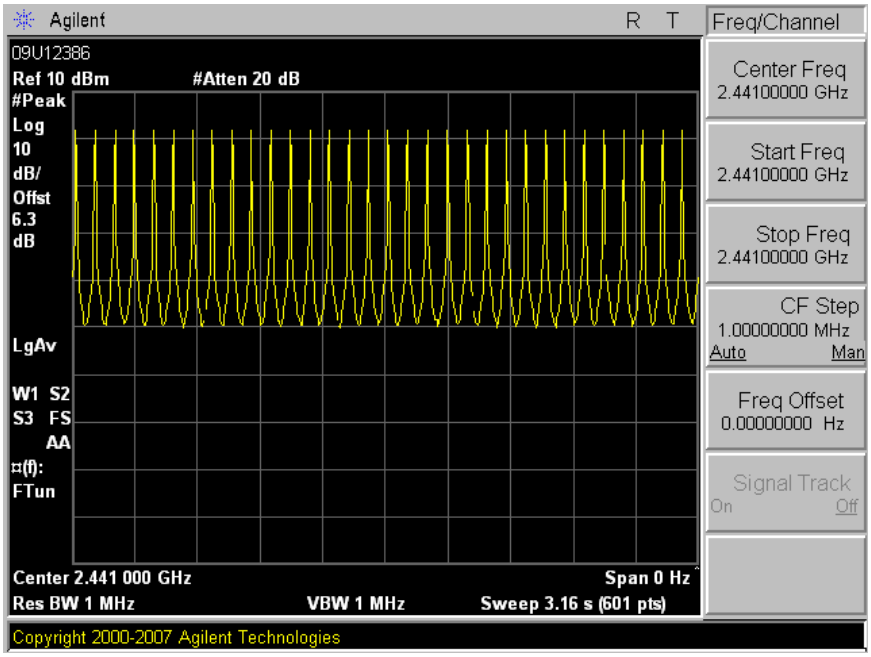
PULSE WIDTH

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is 1.61 dBi, therefore the limit is 30 dBm.

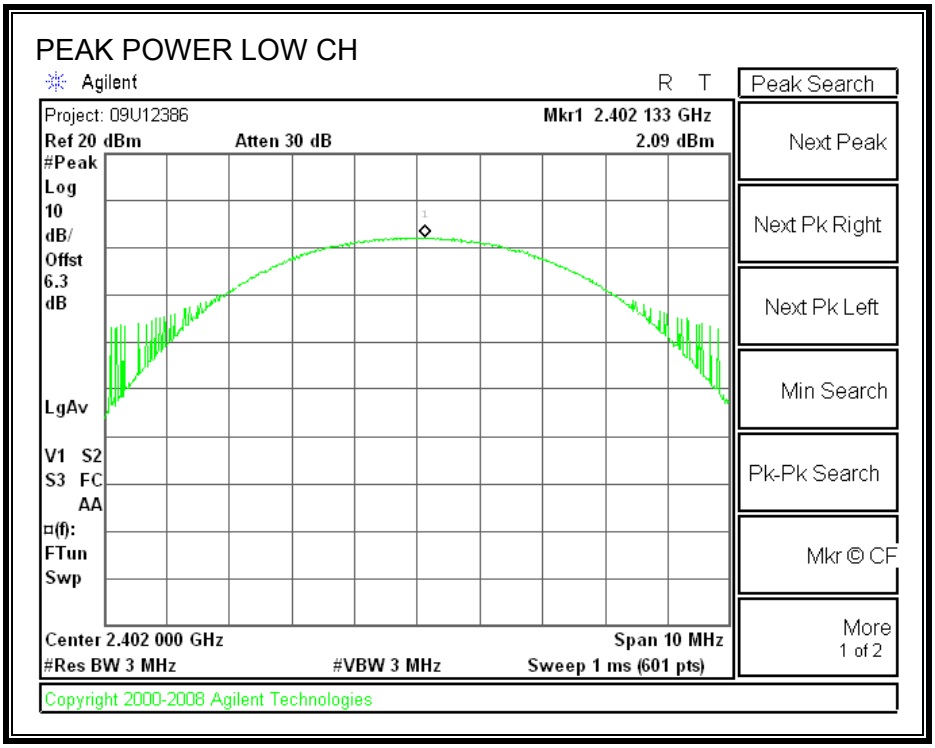
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

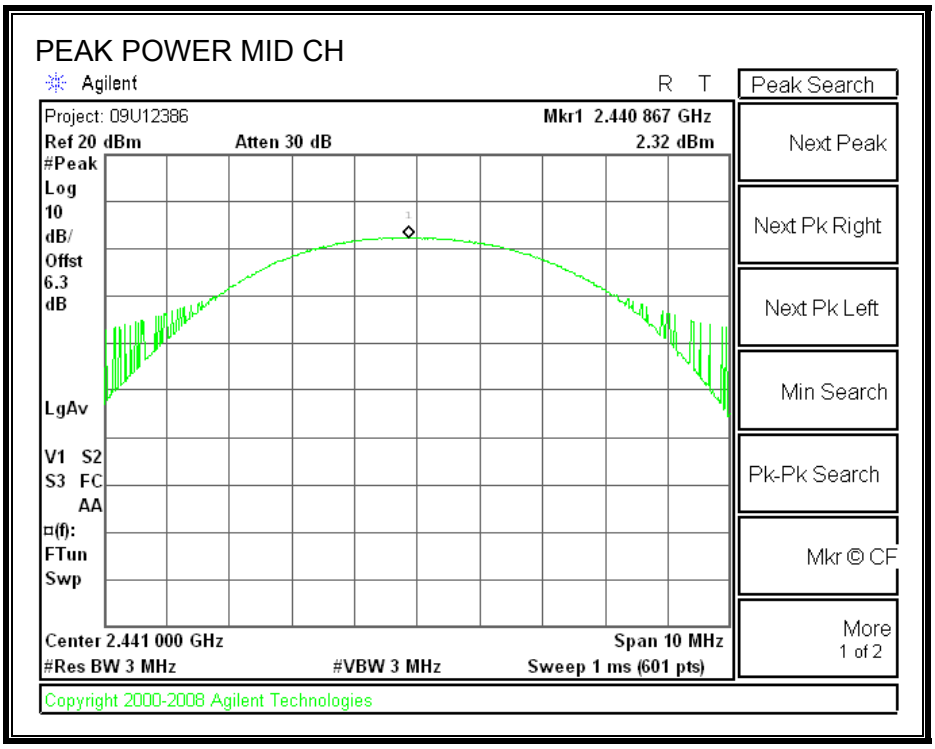
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.09	30.00	-27.91
Middle	2441	2.32	30.00	-27.68
High	2480	2.13	30.00	-27.87

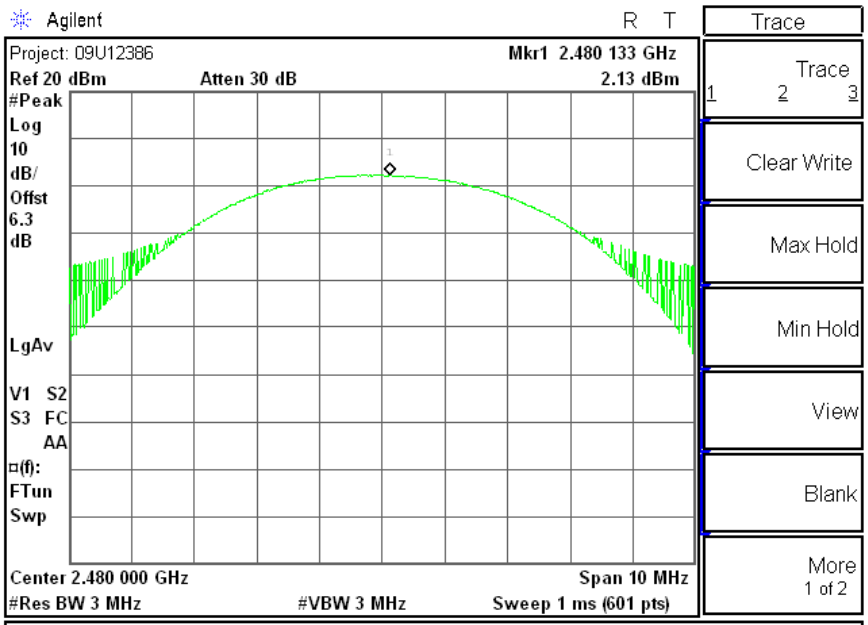
OUTPUT POWER



PEAK POWER MID CH



PEAK POWER HIGH CH



7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 6.3 dB (including 6 dB pad and .3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-4.73
Middle	2441	-4.48
High	2480	-4.65

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

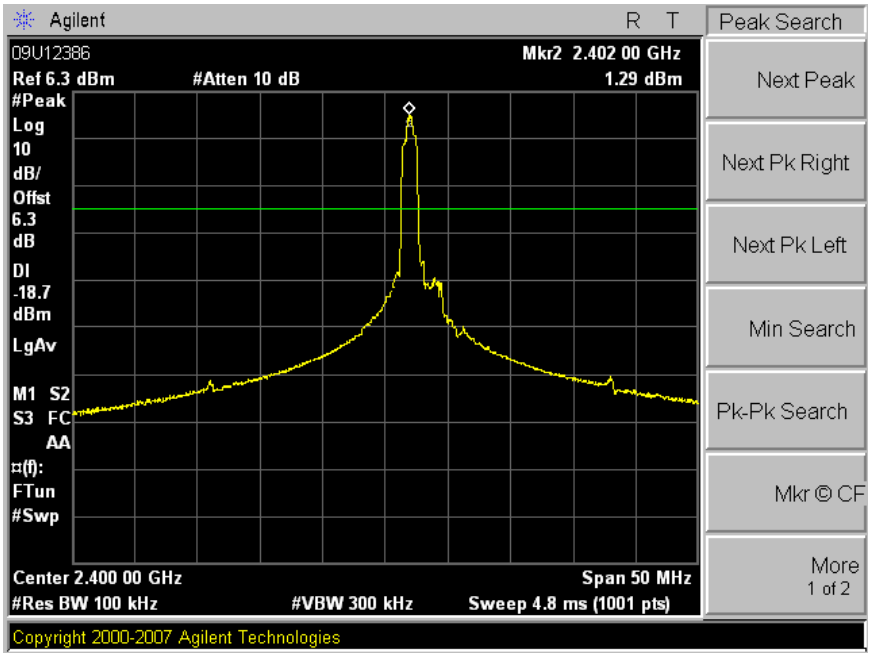
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

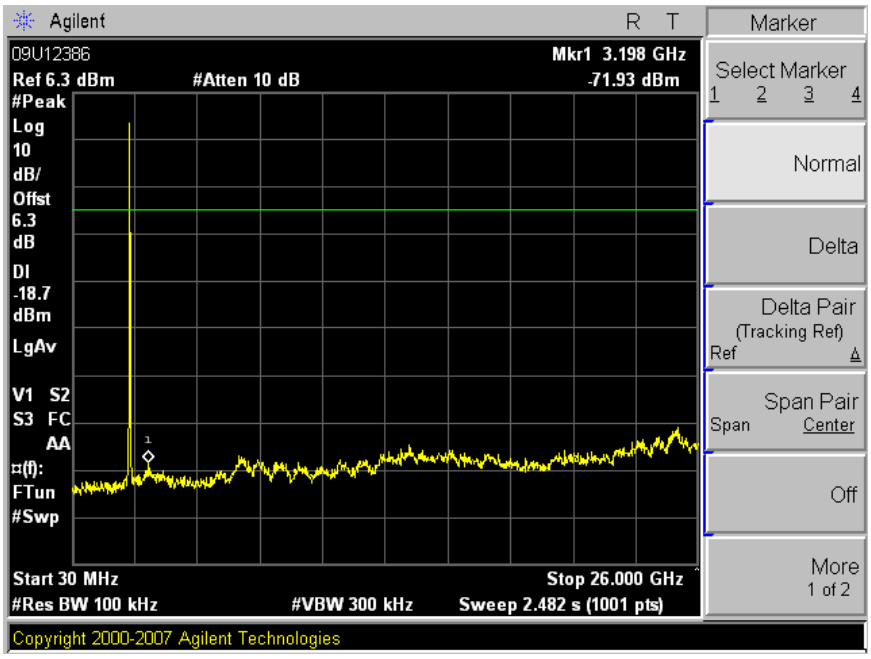
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

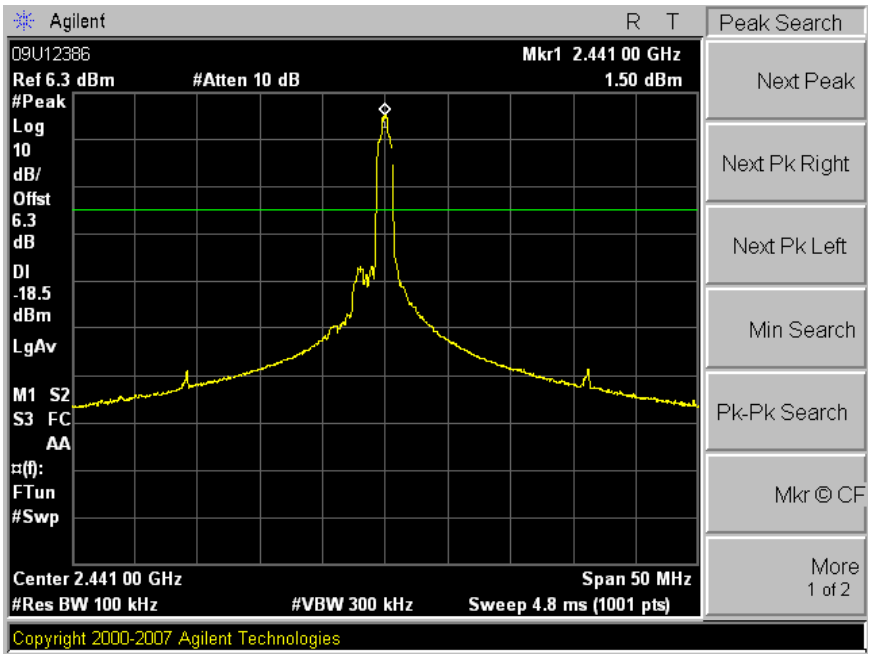


LOW CHANNEL SPURIOUS

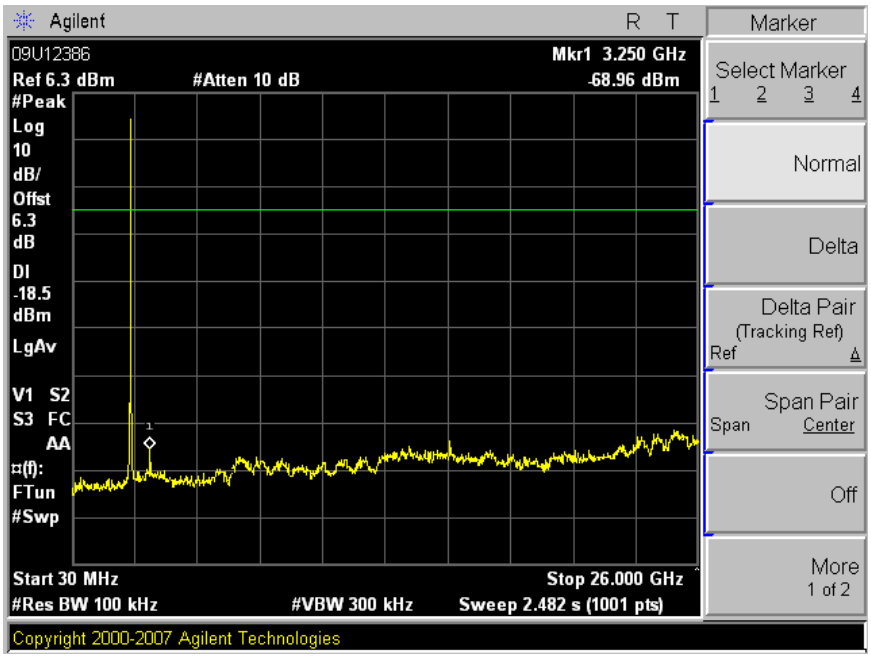


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

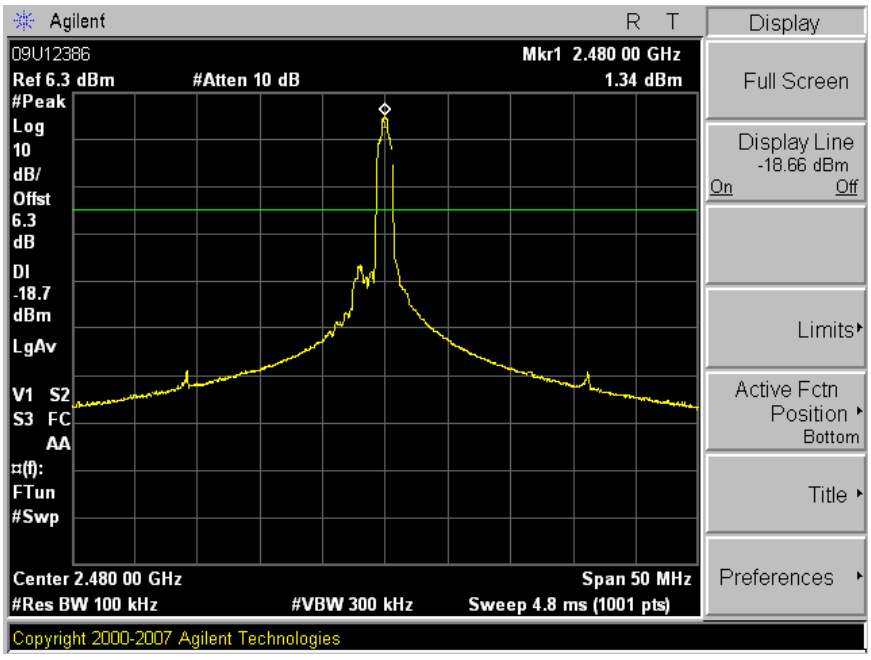


MID CHANNEL SPURIOUS

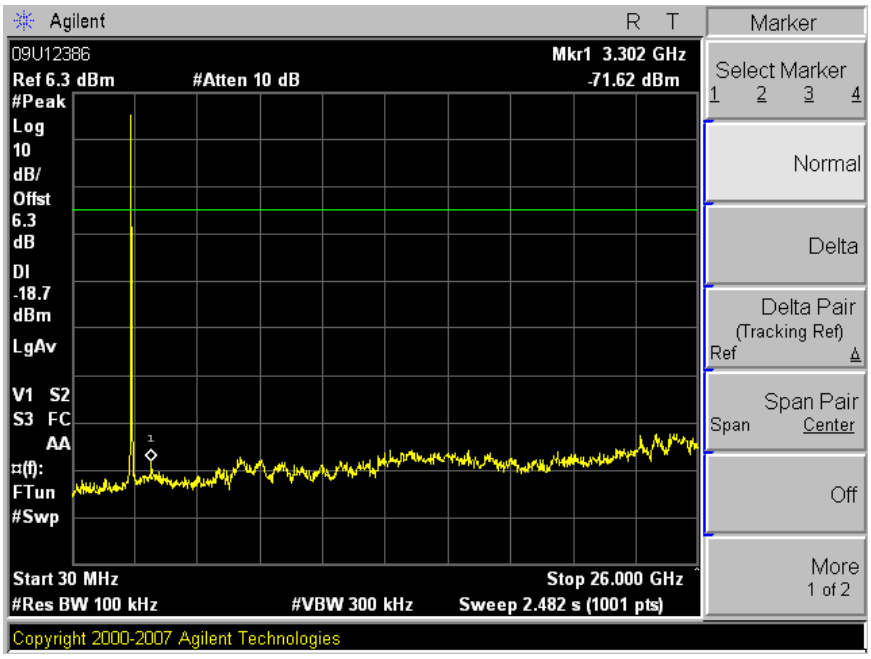


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

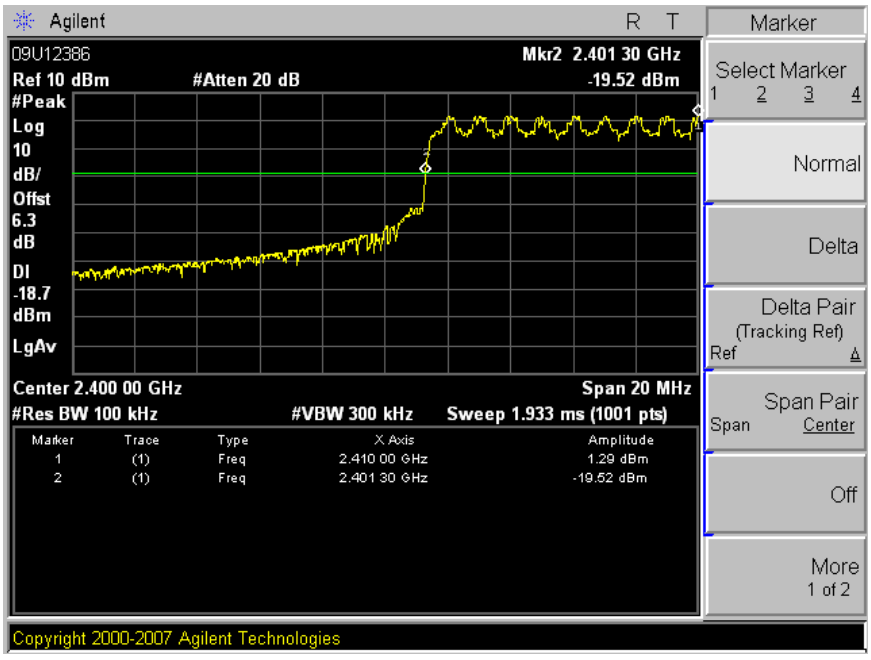


HIGH CHANNEL SPURIOUS

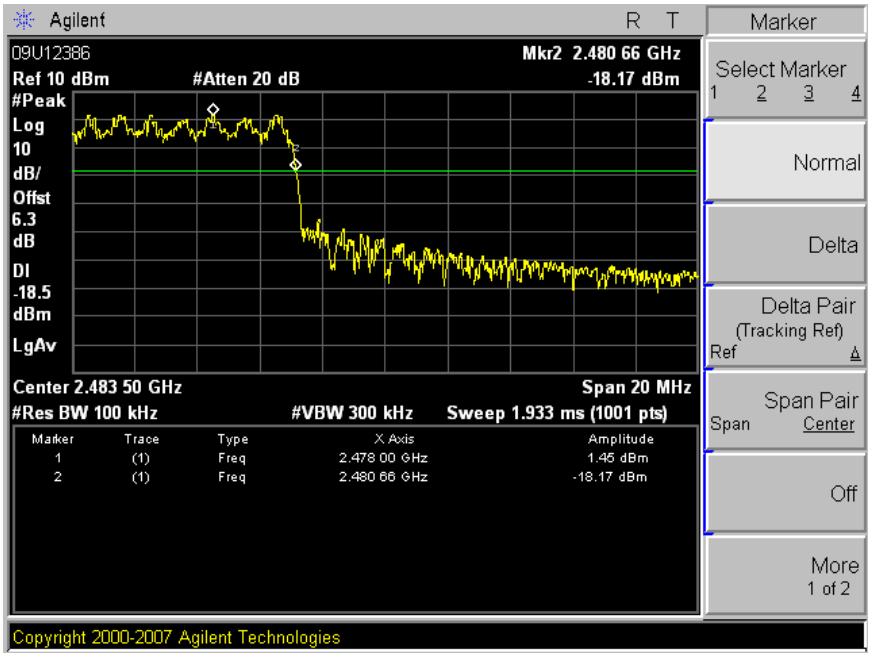


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON

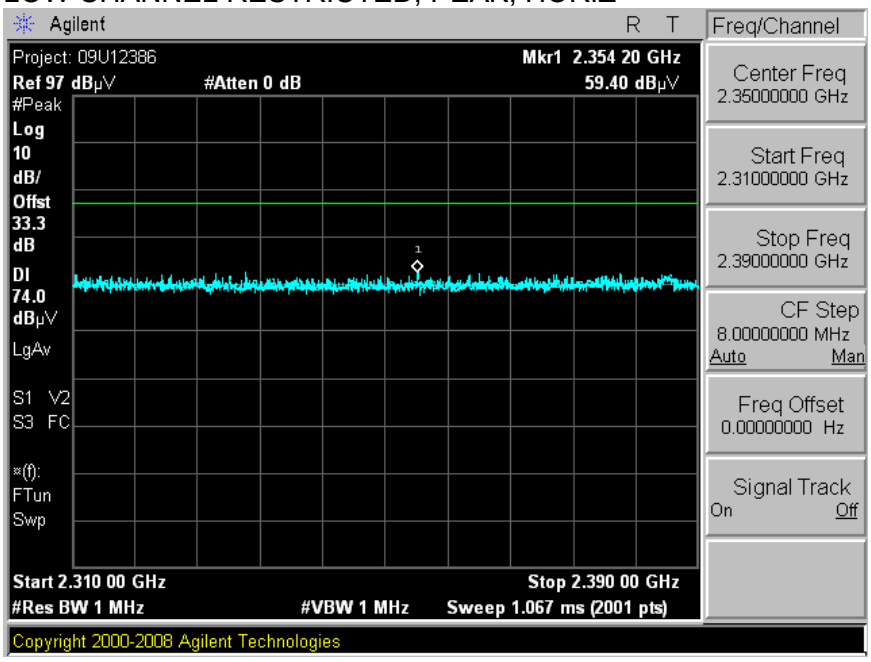


8. RADIATED EMISSION RESULTS

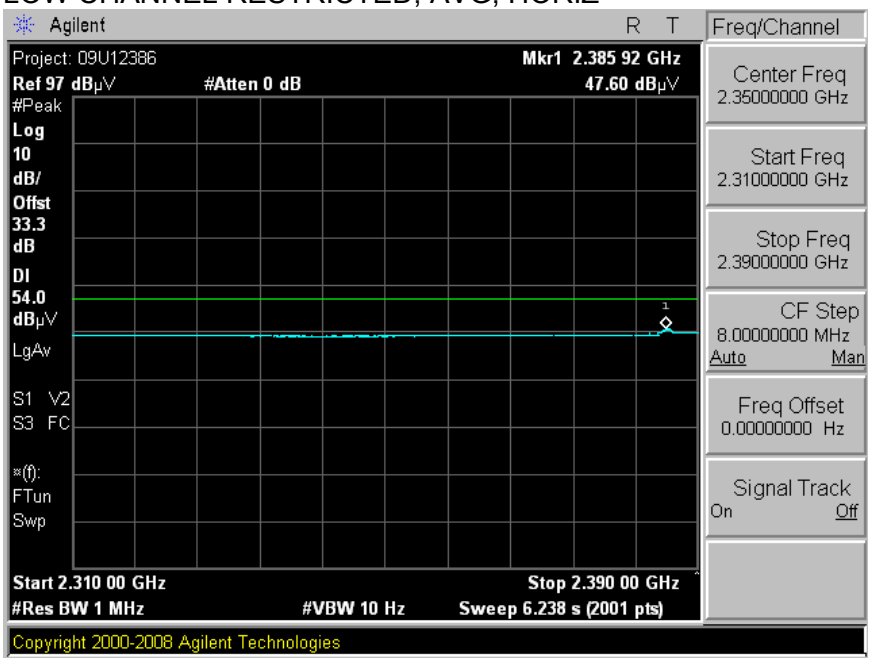
8.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

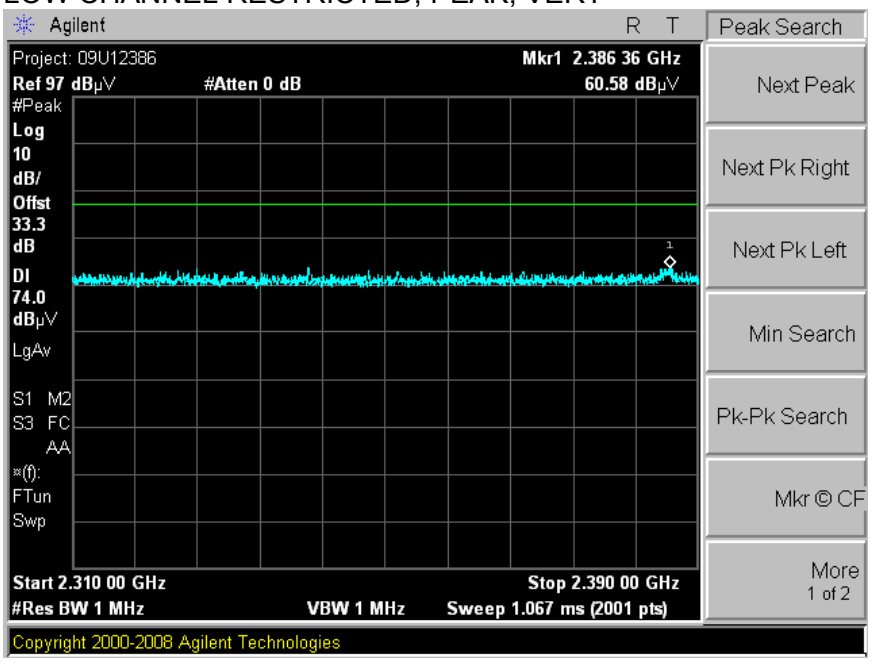


LOW CHANNEL RESTRICTED, AVG, HORIZ

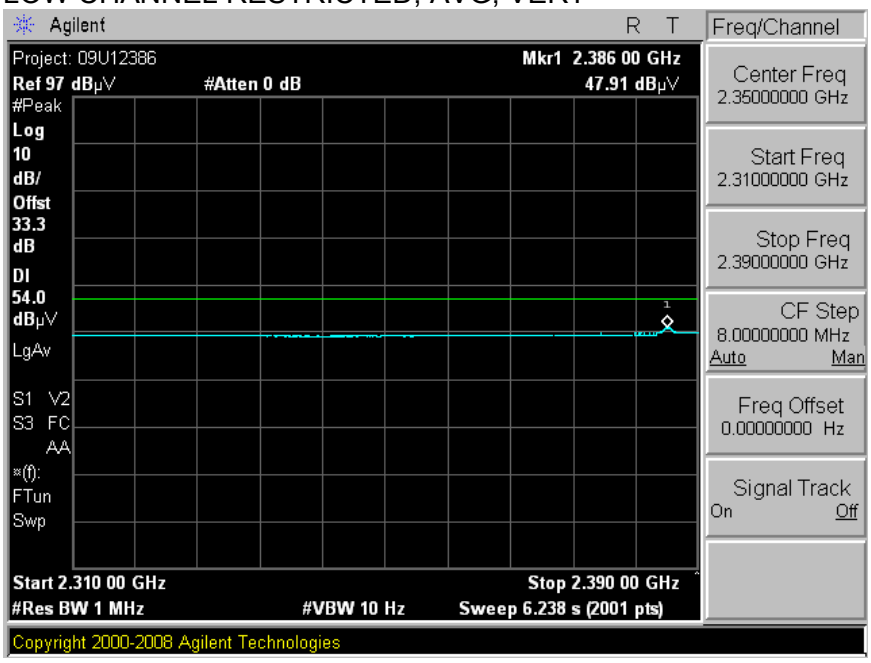


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

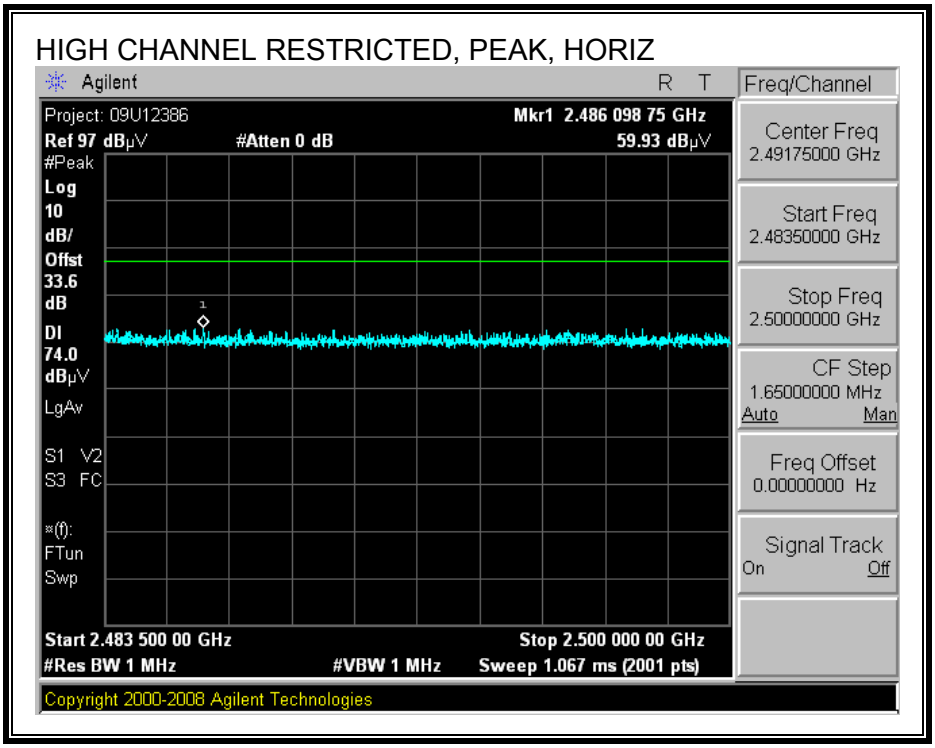
LOW CHANNEL RESTRICTED, PEAK, VERT



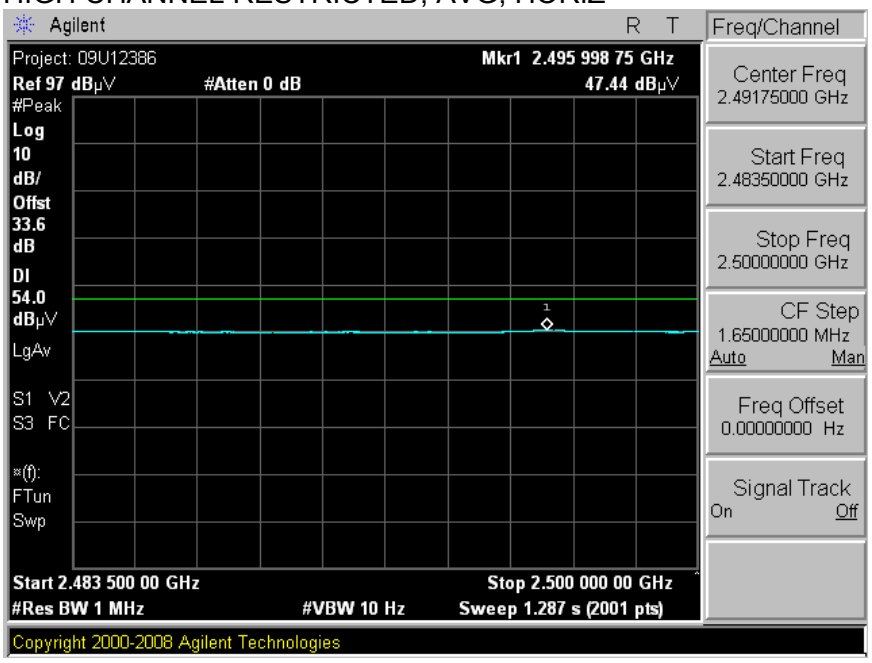
LOW CHANNEL RESTRICTED, AVG, VERT



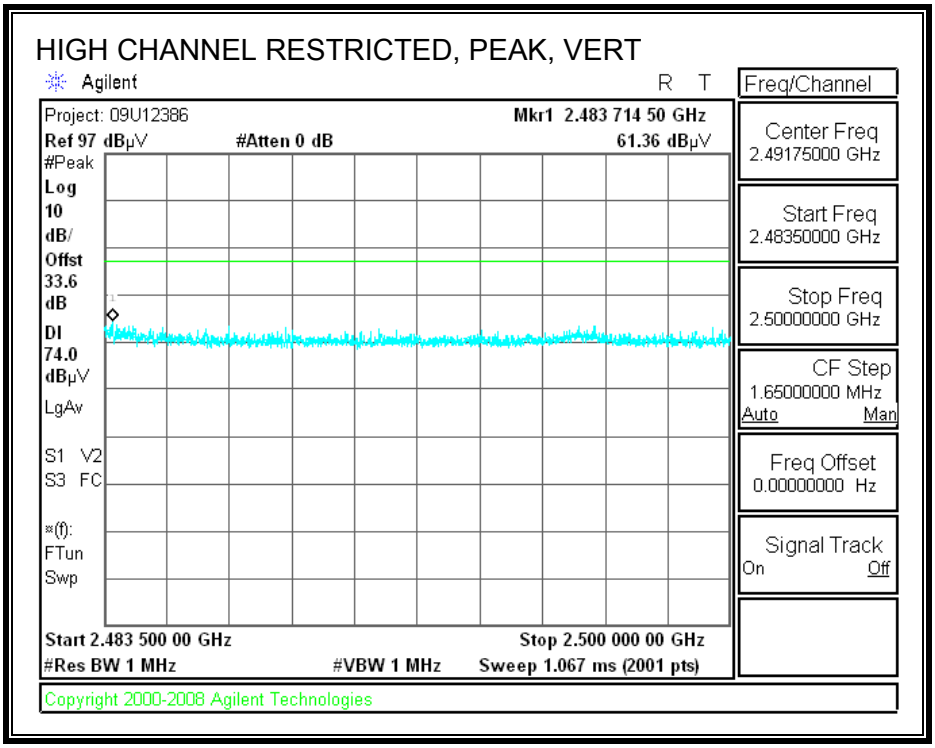
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



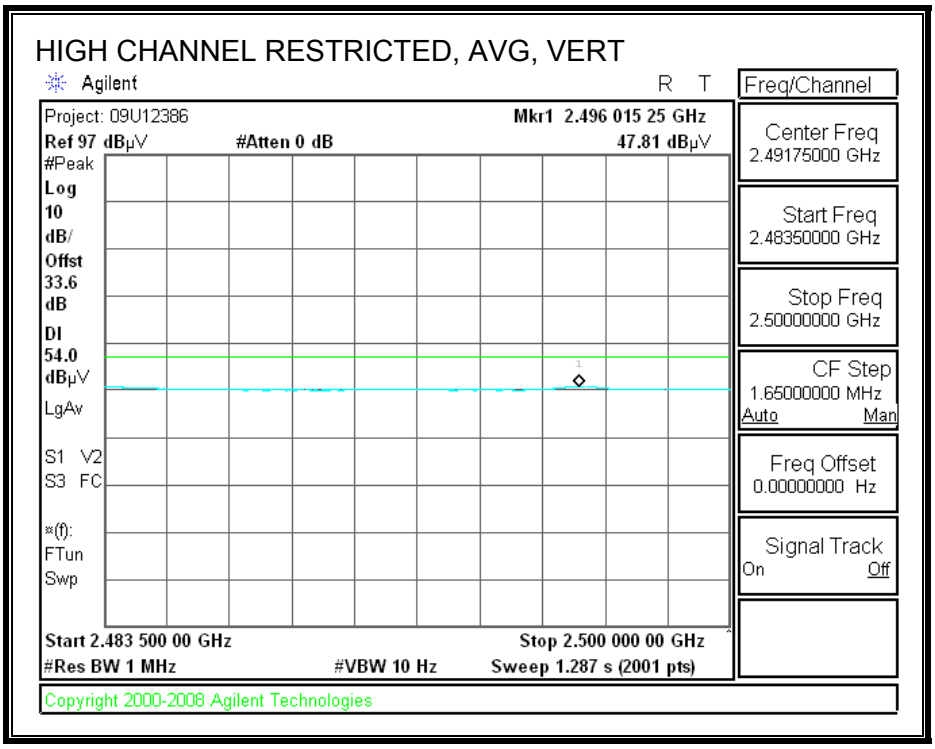
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Plantronics Inc
Project #: 09U12386
Date: 02/10/09
Test Engineer: Thanh Nguyen
Configuration: EUT Plugin Support Laptop
Mode: Tranmit basic Rate GFSK

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A0056		T89; ARA 18-26GHz; S/N:1049	FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements RBW=VBW=1MHz
Average Measurements RBW=1MHz ; VBW=10Hz

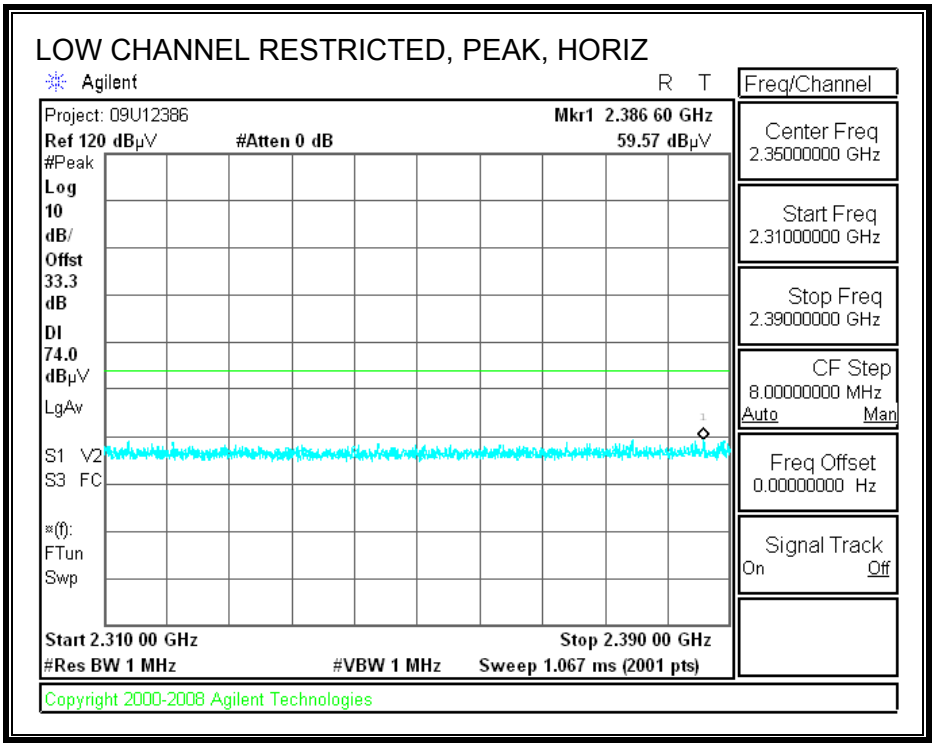
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 2402MHz															
4.804	3.0	43.8	30.1	33.7	5.8	-34.8	0.0	0.0	48.4	34.8	74	54	-25.6	-19.2	V
7.206	3.0	45.0	29.8	36.2	7.2	-34.7	0.0	0.0	53.7	38.5	74	54	-20.3	-15.5	V
9.608	3.0	35.9	23.4	37.9	8.5	-35.0	0.0	0.0	47.3	34.8	74	54	-26.7	-19.2	Noise floor
4.804	3.0	47.9	32.1	33.7	5.8	-34.8	0.0	0.0	52.6	36.7	74	54	-21.4	-17.3	H
7.206	3.0	45.1	29.4	36.2	7.2	-34.7	0.0	0.0	53.8	38.0	74	54	-20.2	-16.0	H
9.608	3.0	35.2	23.5	37.9	8.5	-35.0	0.0	0.0	46.6	34.9	74	54	-27.4	-19.1	Noise floor
Mid Ch 2441MHz															
4.882	3.0	47.4	31.6	33.8	5.8	-34.9	0.0	0.0	52.2	36.4	74	54	-21.8	-17.6	V
7.323	3.0	45.9	29.5	36.2	7.3	-34.7	0.0	0.0	54.7	38.3	74	54	-19.3	-15.7	V
9.764	3.0	36.9	23.4	38.0	8.6	-35.0	0.0	0.0	48.4	35.0	74	54	-25.6	-19.0	Noise floor
4.882	3.0	49.8	32.5	33.8	5.8	-34.9	0.0	0.0	54.6	37.3	74	54	-19.4	-16.7	H
7.323	3.0	49.7	31.6	36.2	7.3	-34.7	0.0	0.0	58.6	40.5	74	54	-15.4	-13.5	H
9.764	3.0	39.7	26.1	38.0	8.6	-35.0	0.0	0.0	51.2	37.6	74	54	-22.8	-16.4	H
12.205	3.0	34.8	22.6	39.1	9.8	-32.4	0.0	0.0	51.3	39.1	74	54	-22.7	-14.9	Noise floor
High Ch 2480MHz															
4.960	3.0	47.5	31.4	33.9	5.9	-34.9	0.0	0.0	52.4	36.3	74	54	-21.6	-17.7	V
7.440	3.0	47.1	30.7	36.3	7.3	-34.6	0.0	0.0	56.1	39.7	74	54	-17.9	-14.3	V
9.920	3.0	37.3	23.7	38.0	8.7	-35.1	0.0	0.0	49.0	35.4	74	54	-25.0	-18.6	Noise floor
4.960	3.0	49.6	32.4	33.9	5.9	-34.9	0.0	0.0	54.5	37.3	74	54	-19.5	-16.7	H
7.440	3.0	51.7	32.8	36.3	7.3	-34.6	0.0	0.0	60.7	41.8	74	54	-13.3	-12.2	H
9.920	3.0	40.9	26.8	38.0	8.7	-35.1	0.0	0.0	52.6	38.5	74	54	-21.4	-15.5	H
12.400	3.0	35.3	23.0	39.3	9.9	-32.4	0.0	0.0	52.1	39.8	74	54	-21.9	-14.2	Noise floor
No other emissions were deteted above noise floor.															

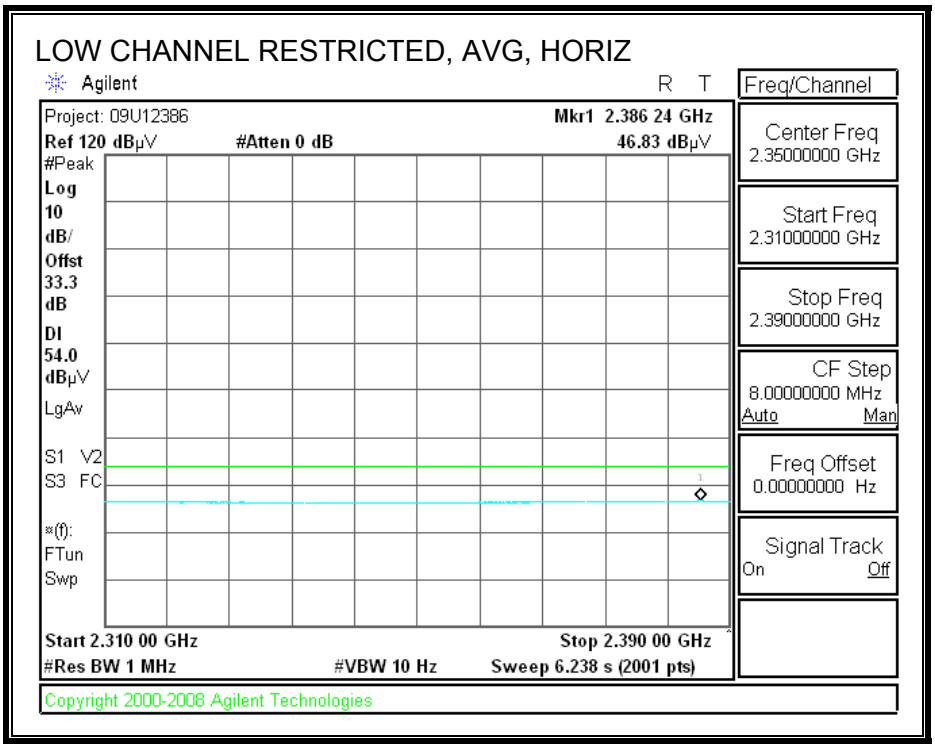
Rev. 11.10.08

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

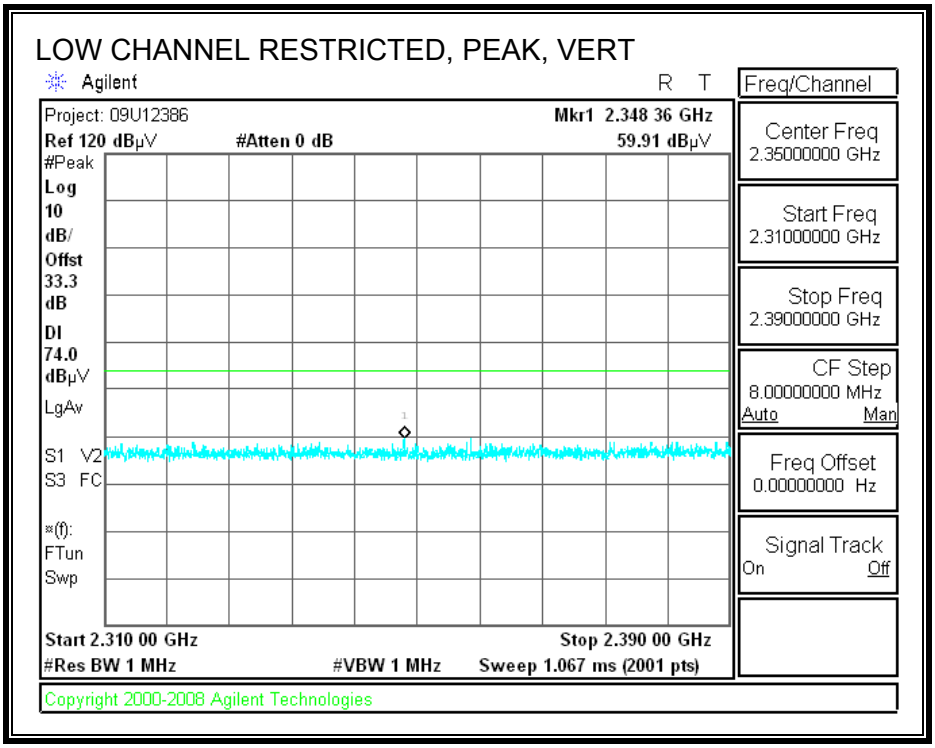
8.2. ENHANCED DATA RATE QPSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

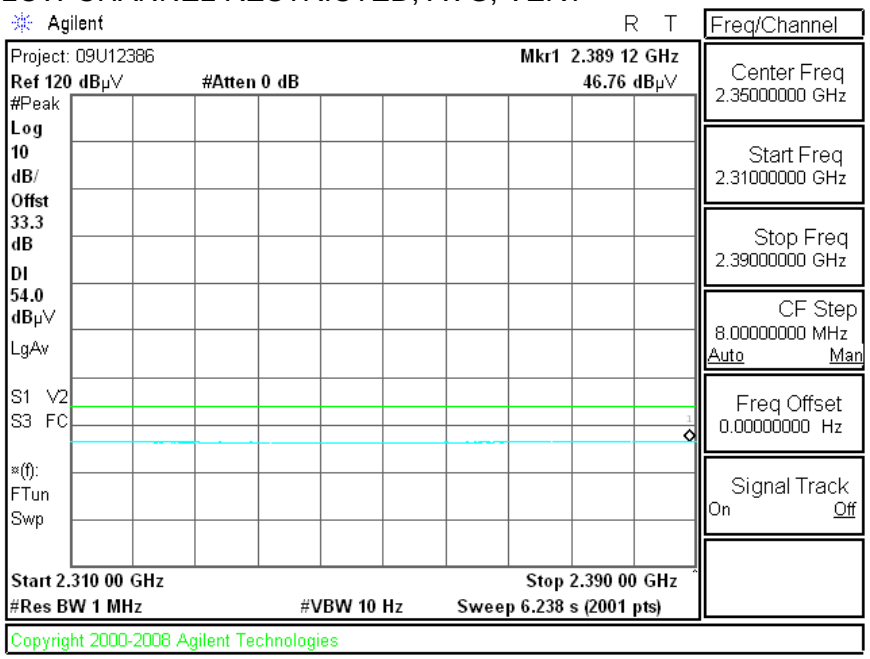




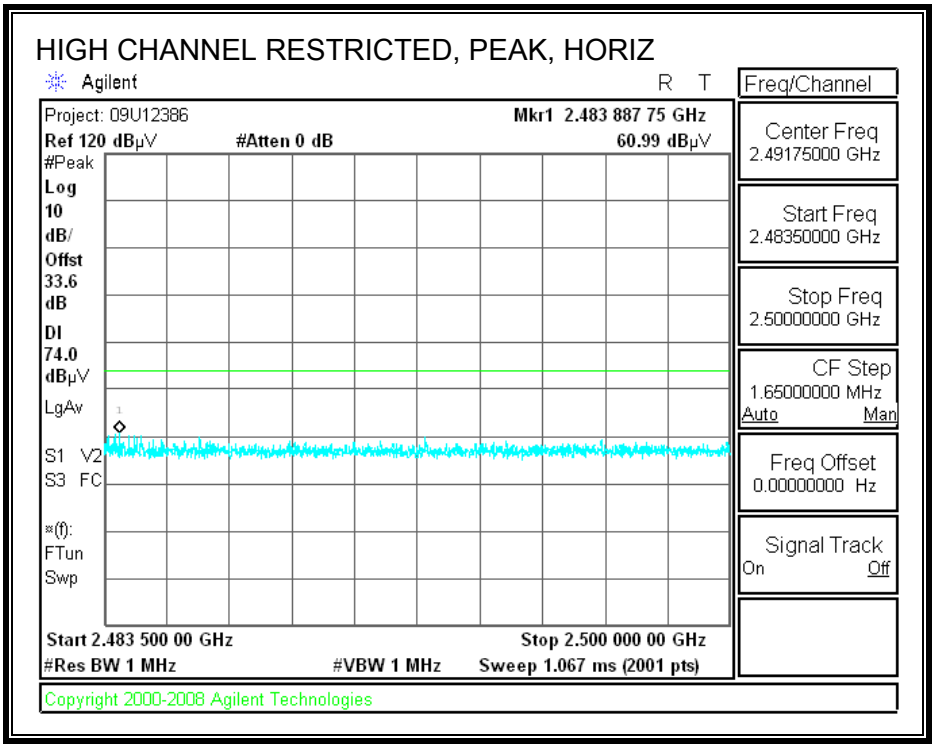
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



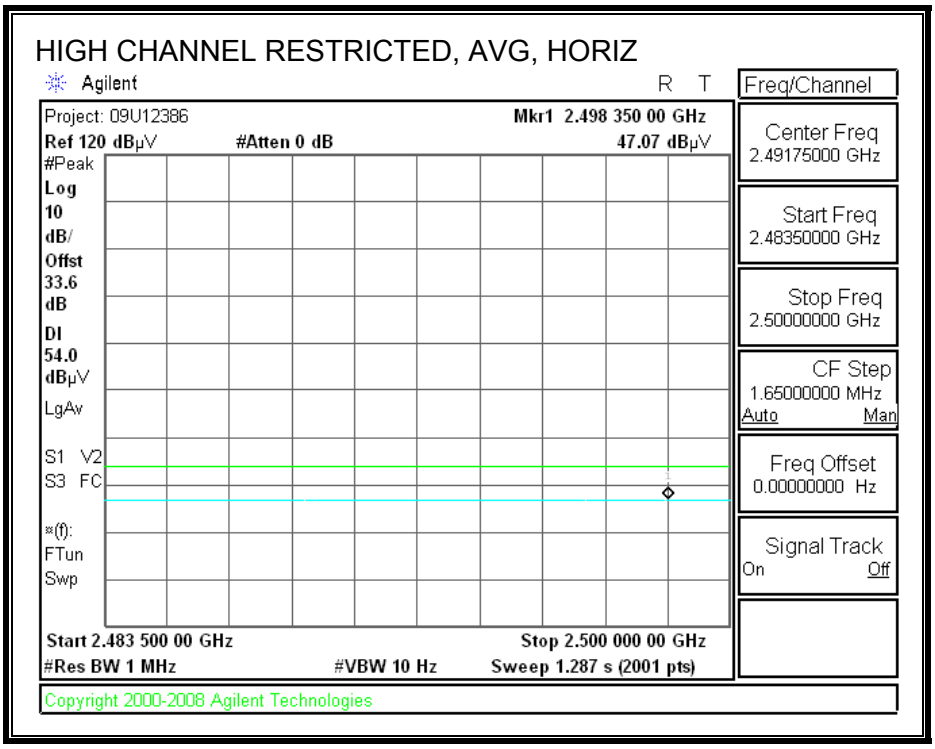
LOW CHANNEL RESTRICTED, AVG, VERT



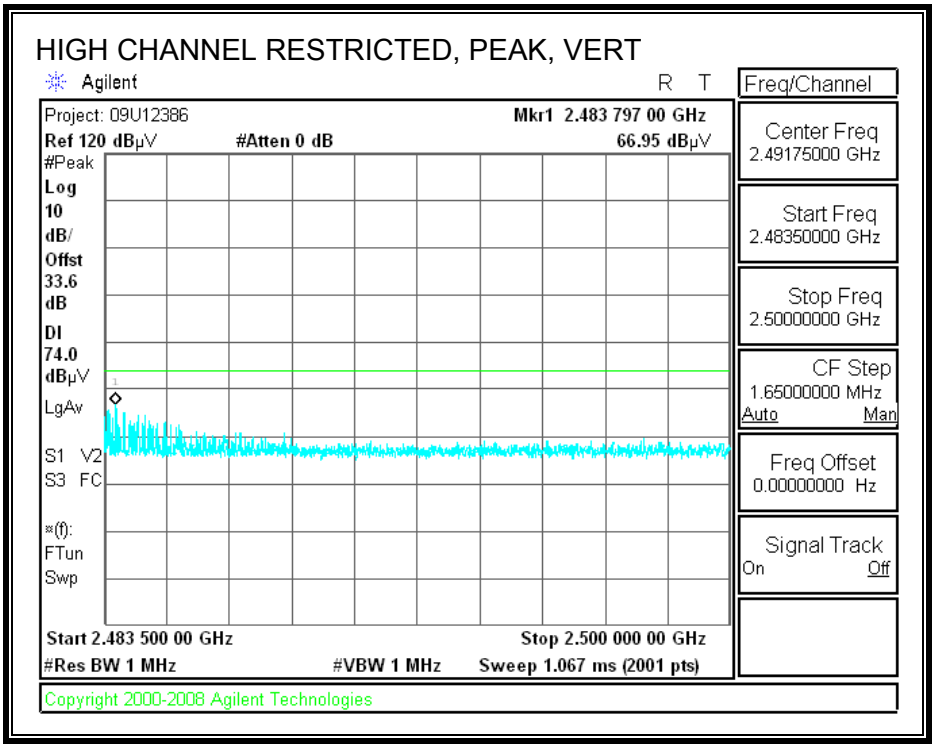
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



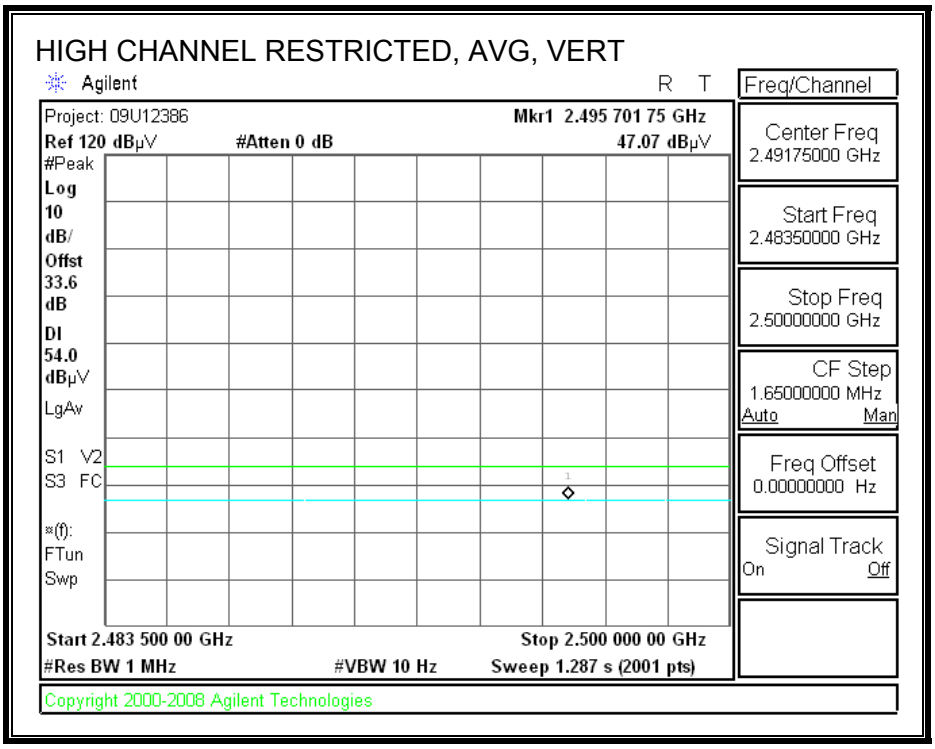
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Plantronics Inc
Project #: 09U12386
Date: 02/10/09
Test Engineer: Thanh Nguyen
Configuration: EUT Plugin Support Laptop
Mode: Tranmit EDR DQPSK

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A0056		T89; ARA 18-26GHz; S/N:1049	FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements RBW=VBW=1MHz
Average Measurements RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 2402MHz															
4.804	3.0	37.3	24.8	33.7	5.8	-34.8	0.0	0.0	42.0	29.5	74	54	-32.0	-24.5	V
7.206	3.0	37.3	24.8	36.2	7.2	-34.7	0.0	0.0	46.0	33.5	74	54	-28.0	-20.5	Noise floor
4.804	3.0	37.4	24.6	33.7	5.8	-34.8	0.0	0.0	42.1	29.3	74	54	-31.9	-24.7	H
7.206	3.0	36.8	24.9	36.2	7.2	-34.7	0.0	0.0	45.4	33.6	74	54	-28.6	-20.4	Noise floor
Mid Ch 2441MHz															
4.882	3.0	38.9	25.7	33.8	5.8	-34.9	0.0	0.0	43.7	30.5	74	54	-30.3	-23.5	V
7.323	3.0	36.7	24.4	36.2	7.3	-34.7	0.0	0.0	45.5	33.3	74	54	-28.5	-20.7	Noise floor
4.882	3.0	38.1	25.7	33.8	5.8	-34.9	0.0	0.0	42.9	30.5	74	54	-31.1	-23.5	H
7.323	3.0	36.4	24.4	36.2	7.3	-34.7	0.0	0.0	45.2	33.3	74	54	-28.8	-20.7	Noise floor
High Ch 2480MHz															
4.960	3.0	36.9	25.0	33.9	5.9	-34.9	0.0	0.0	41.8	29.9	74	54	-32.2	-24.1	V
7.440	3.0	37.5	25.0	36.3	7.3	-34.6	0.0	0.0	46.5	34.0	74	54	-27.5	-20.0	Noise floor
4.960	3.0	36.3	24.7	33.9	5.9	-34.9	0.0	0.0	41.2	29.7	74	54	-32.8	-24.3	H
7.440	3.0	36.7	23.5	36.3	7.3	-34.6	0.0	0.0	45.7	32.5	74	54	-28.3	-21.5	Noise floor
No other emissions were deteted above noise floor.															

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f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

9. RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Plantronics Inc
Project #: 09U12386
Date: 02/13/09
Test Engineer: Thanh Nguyen
Configuration: EUT Plugin Support Laptop
Mode: Receive Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A0056			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch 2402MHz															
1.140	3.0	48.5	47.1	26.1	2.5	-36.0	0.0	0.0	41.0	39.7	74	54	-33.0	-14.3	V
1.200	3.0	48.4	46.1	26.2	2.6	-36.0	0.0	0.0	41.2	39.0	74	54	-32.8	-15.0	V
1.142	3.0	49.0	47.2	26.1	2.5	-36.0	0.0	0.0	41.6	39.8	74	54	-32.4	-14.2	H
1.203	3.0	52.7	49.2	26.3	2.6	-36.0	0.0	0.0	45.6	42.1	74	54	-28.4	-11.9	H
Mid Ch 2441MHz															
1.142	3.0	48.7	47.2	26.1	2.5	-36.0	0.0	0.0	41.3	39.8	74	54	-32.7	-14.2	V
1.202	3.0	48.6	46.3	26.3	2.6	-36.0	0.0	0.0	41.5	39.2	74	54	-32.5	-14.8	V
1.462	3.0	43.3	41.3	26.9	2.9	-35.8	0.0	0.0	37.3	35.3	74	54	-36.7	-18.7	V
1.102	3.0	50.0	48.4	26.0	2.5	-36.1	0.0	0.0	42.4	40.7	74	54	-31.6	-13.3	H
1.202	3.0	50.2	46.2	26.3	2.6	-36.0	0.0	0.0	43.0	39.1	74	54	-31.0	-14.9	H
High Ch 2480MHz															
1.141	3.0	48.5	47.2	26.1	2.5	-36.0	0.0	0.0	41.1	39.8	74	54	-32.9	-14.2	V
1.201	3.0	48.7	46.2	26.3	2.6	-36.0	0.0	0.0	41.6	39.0	74	54	-32.4	-15.0	V
1.461	3.0	47.3	30.7	26.9	2.9	-35.8	0.0	0.0	41.4	24.8	74	54	-32.6	-29.2	V
1.140	3.0	48.6	47.1	26.1	2.5	-36.0	0.0	0.0	41.2	39.6	74	54	-32.8	-14.4	H
1.200	3.0	48.7	45.3	26.2	2.6	-36.0	0.0	0.0	41.6	38.2	74	54	-32.4	-15.8	H

Rev. 11.10.08

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

10. RADIATED EMISSIONS 30-1000 MHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL DATA

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 4 File#: FCC_09U12386.EMI Date: 02-13-2009 Time: 11:52:11

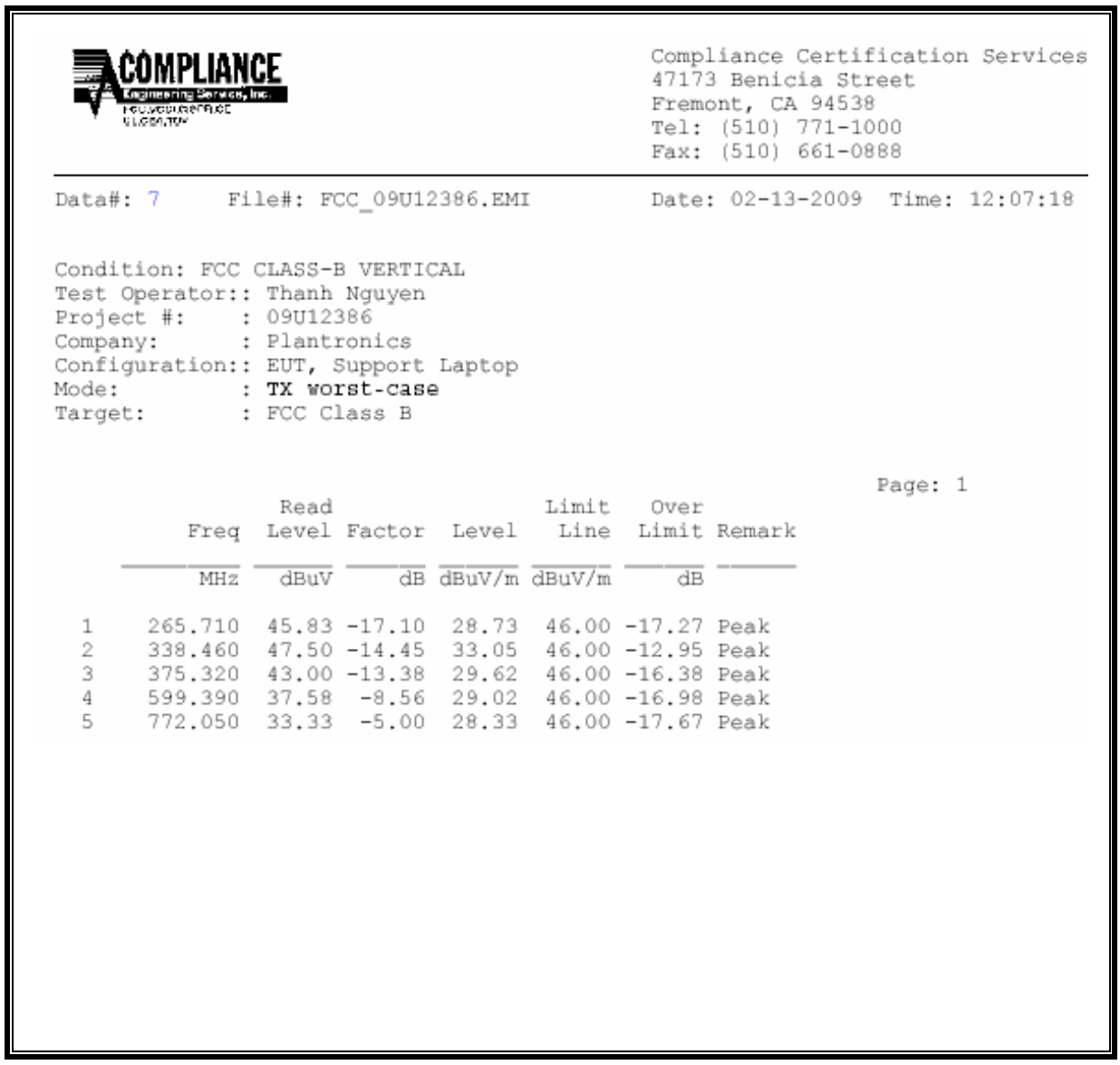
Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Thanh Nguyen
Project #: : 09U12386
Company: : Plantronics
Configuration:: EUT, Support Laptop
Mode: : TX worst-case
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	79.470	51.83	-23.27	28.57	40.00	-11.43	Peak
2	315.180	43.67	-15.10	28.57	46.00	-17.43	Peak
3	338.460	47.50	-14.45	33.05	46.00	-12.95	Peak
4	375.320	43.00	-13.38	29.62	46.00	-16.38	Peak
5	600.360	37.83	-8.53	29.30	46.00	-16.70	Peak
6	642.070	36.50	-7.60	28.90	46.00	-17.10	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL DATA



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: FCC_09U12386.EMI Date: 02-13-2009 Time: 12:07:18

Condition: FCC CLASS-B VERTICAL
Test Operator:: Thanh Nguyen
Project #: : 09U12386
Company: : Plantronics
Configuration:: EUT, Support Laptop
Mode: : TX worst-case
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	265.710	45.83	-17.10	28.73	46.00	-17.27	Peak
2	338.460	47.50	-14.45	33.05	46.00	-12.95	Peak
3	375.320	43.00	-13.38	29.62	46.00	-16.38	Peak
4	599.390	37.58	-8.56	29.02	46.00	-16.98	Peak
5	772.050	33.33	-5.00	28.33	46.00	-17.67	Peak

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

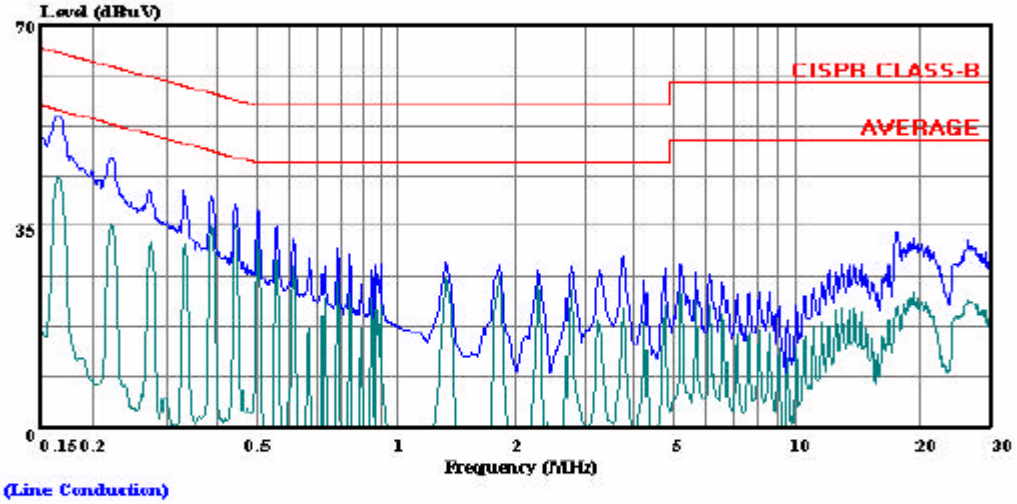
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	54.21	--	43.43	0.00	65.16	55.16	-10.95	-11.73	L1
0.22	46.97	--	35.56	0.00	62.74	52.74	-15.77	-17.18	L1
0.50	37.57	--	34.29	0.00	56.00	46.00	-18.43	-11.71	L1
0.17	56.48	--	43.56	0.00	65.16	55.16	-8.68	-11.60	L2
0.47	45.36	--	32.20	0.00	56.50	46.50	-11.14	-14.30	L2
0.96	46.47	--	24.48	0.00	56.00	46.00	-9.53	-21.52	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 09U12386 LC.EMI Date: 02-17-2009 Time: 16:34:46

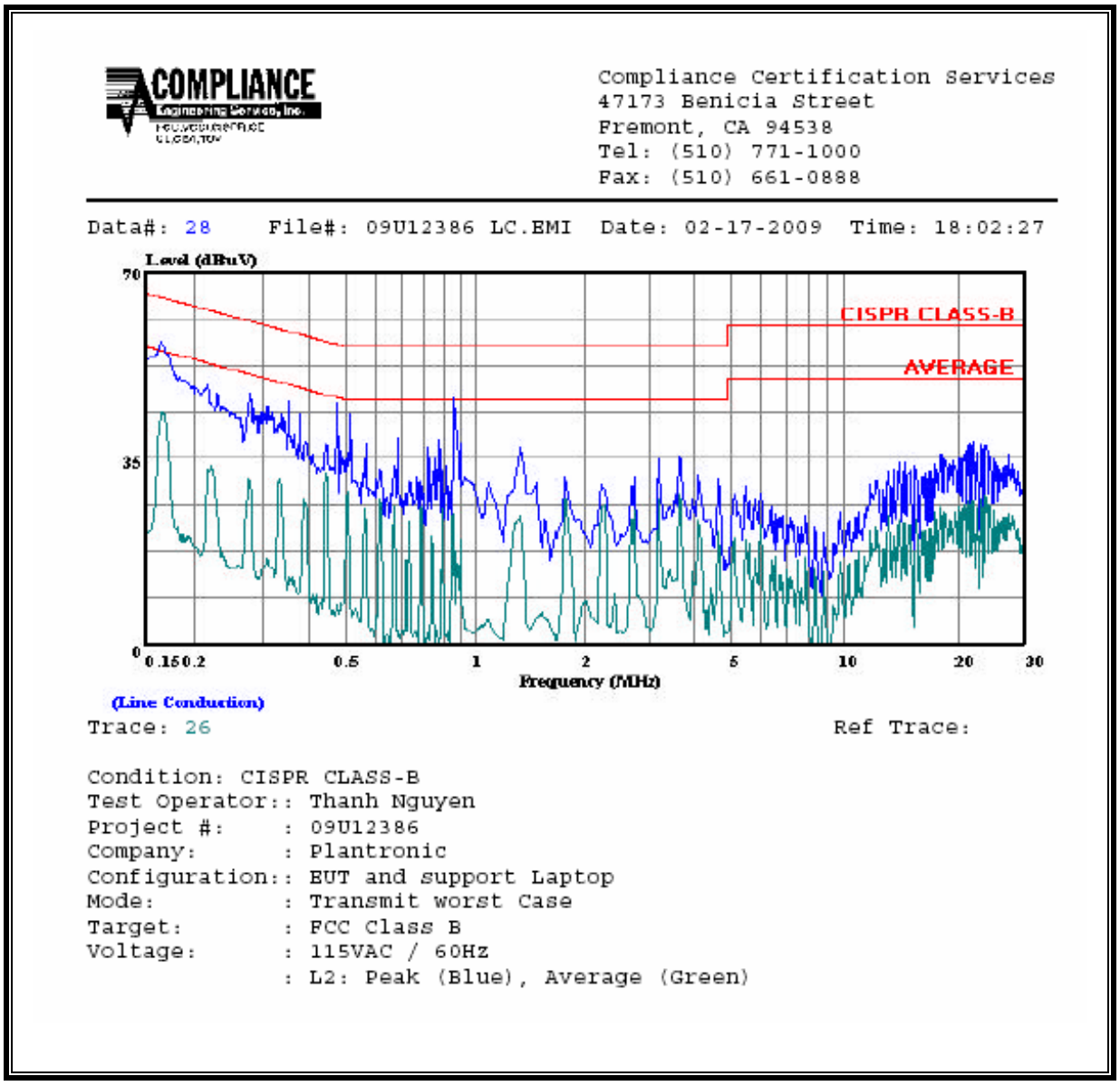


(Line Conduction)

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Thanh Nguyen
Project #: : 09U12386
Company: : Plantronic
Configuration:: EUT and support Laptop
Mode: : Transmit worst Case
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L1: Peak (Blue), Average (Green)

LINE 2 RESULTS



12. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
Bluetooth	2.4 GHz	20.0	12.21	1.61	0.00	0.05